DOCUMENT RESUME

ED 167 195 IR 007 273

TITLE	A National Periodicals Center Technical Development Plan.
INSTITUTION	Council on Library Resources, Inc., Washington, D.C.
SPONS AGENCY	Library of Congress, Washington, D.C.
PUB DATE	78
NOTE	260p.
EDRS PRICE	MF-$0.83 HC-$14.05 Plus Postage.
DESCRIPTORS	Bibliographies; Budgets; Delivery Systems; Facility Planning; Flow Charts; *Information Centers; Management; *Master Plans; *National Programs; Objectives; *Periodicals; Referral; Site Selection; Systems Development
IDENTIFIERS	*National Periodicals Center

ABSTRACT

This technical plan for developing, managing, and operating a national periodicals center (NPC), which was prepared at the request of the Library of Congress, is designed so that it could be used by the Library or any other agency prepared to assume responsibility for the creation of a major periodicals facility. The overall goal of the NPC is to improve access to periodical literature for libraries and thus to individuals using libraries (1) by providing an efficient, reliable, and responsive document delivery system for periodical literature, (2) by establishing effective working relationships with the publishing community, and (3) by helping to shape a national library system through its operating policies and procedures. Means of achieving these objectives are discussed in chapters focusing on specific issues: access to NPC, NPC-publishing community relationship, collection development, referral system, delivery, technical aspects (preservation, reprographics, collections storage and retrieval, communications, bibliographic control, technical processing, and systems development), site considerations, governance, and management. An implementation plan is also provided. Appendices include an estimate of request traffic, additional communications details, data-processing considerations, estimated load factors, full-time equivalent staffing levels by year, and a bibliography. (JD)

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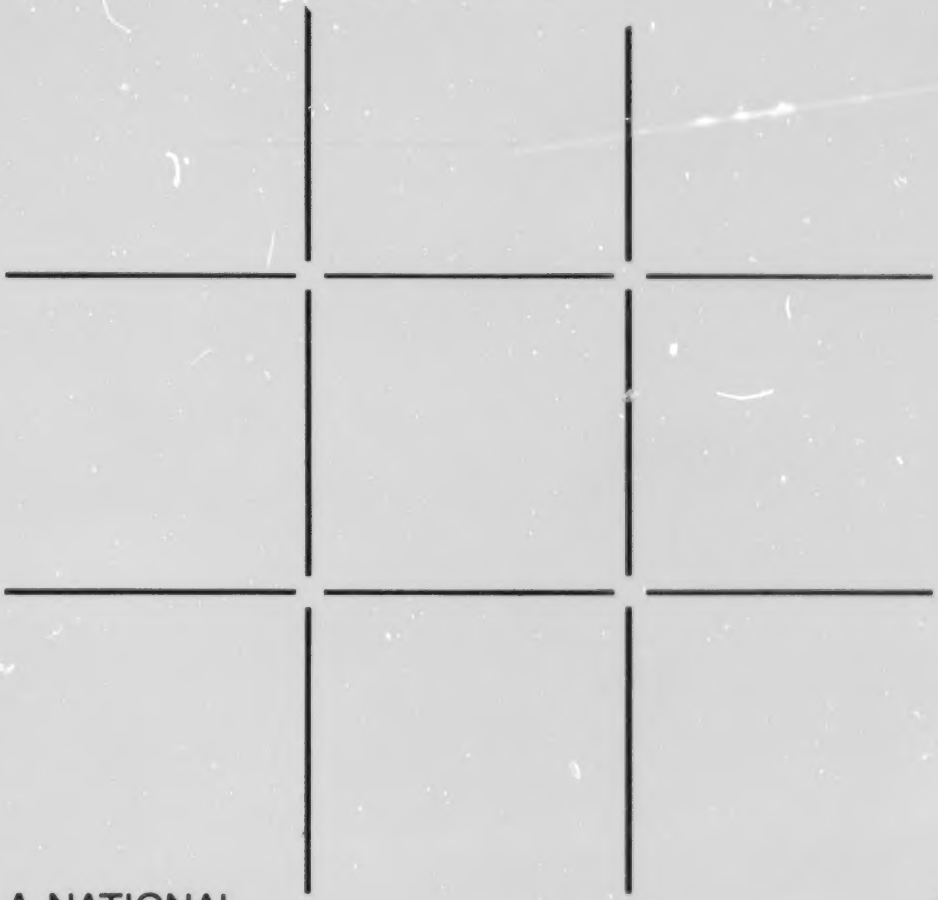

A NATIONAL PERIODICALS CENTER

1978

Technical Development Plan

Council on Library Resources, Inc.

IR007273

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FOREWORD

This plan for a National Periodicals Center was prepared by the Council on Library Resources at the request of the Library of Congress and continues a series of steps initiated by the National Commission on Libraries and Information Science that will, it is hoped, bring a center of the kind envisioned into being in the near future. The substance of the report reflects the views of many individuals who took part in its preparation. A CLR project team headed by C. Lee Jones assumed primary responsibility for the effort. Several consultants worked with the project team on certain technical sections. CLR staff and the consultants are listed below.

Many individuals from public, college, research, and special libraries reviewed all or part of the document at several stages and contributed greatly to the development of the key characteristics of the plan as well as to its refinement in detail.

The result of this effort over a period of several months is the report that follows. It is not a formal pronouncement by the Council on Library Resources but is rather a document for consideration, to be refined if necessary and used without delay to help turn the aspirations long held by librarians and the users of libraries into accomplishment.

The cost of preparing the document was met by grants from a number of foundations that share an interest in libraries and a willingness to support work to improve their functional and fiscal performance.

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July, 1978

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The Commonwealth Fund
The Ford Foundation
The William and Flora Hewlett Foundation
Lilly Endowment, Inc.
The Andrew W. Mellon Foundation
The Rockefeller Foundation
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SUMMARY

In the fall of 1977, the Library of Congress (LC) asked the Council on Library Resources (CLR) to prepare a technical development plan for a U.S. national periodicals center (NPC). The need for such a facility was formalized by the National Commission on Libraries and Information Science in its 1977 document Effective Access to Periodical Literature, which recommended that the Library of Congress assume responsibility for developing, managing, and operating the center. LC and the Council agreed that the plan would be prepared in such a way that it could be used by the Library or any other agency prepared to assume responsibility for the creation of a major periodicals facility. Several foundations contributed to the cost of preparing the plan, which was completed in August 1978.

The goal of the National Periodicals Center is to improve access to periodical literature for libraries and thus to individuals using libraries. The intent of the plan is to assure that the NPC will accomplish this goal (1) by providing an efficient, reliable, and responsive document delivery system for periodical material, (2) by working effectively with the publishing community, and (3) by helping to shape a national library system through NPC operating policies and procedures.

The specific operating objectives of the NPC follow logically from this goal and are:

1. To provide a reliable method of access to a comprehensive collection of periodical literature.
2. To reduce the overall costs of acquiring periodical material by interlibrary loan (ILL).
3. To reduce the time required to obtain requested material.
4. To assure that for any document delivered through the NPC, all required copyright fees and obligations will have been paid.
5. To act, under appropriate conditions, as a distribution agent for publishers.
6. To provide libraries with additional options as they establish their own collection development and maintenance policies.
7. To promote the development of local and regional resource sharing.
8. To contribute to the preservation of periodical material.
9. To provide a base for the development of new and imaginative publication strategies.
10. To provide a working example of a national access service that might be extended to other categories of materials.

These operating objectives make it clear that the National Periodicals Center will link in new ways the collecting and distribution functions of libraries with the distribution activities of at least some kinds of publishing. The center's governance must also be approached in a new, imaginative way, one that will assure close coordination between its operation and the development of other national programs (e.g., bibliographic control, communications, etc.) that together will constitute the foundation of a national library and information system. But the present library and information structure of the nation is composed of many discrete components. This fact, together with the complexity of library functions and the dispersion of library services, makes it unlikely that there will or should be a formal prescriptive centralized agency charged with operating a single hierarchical national library system.

What seems required, as the plan suggests, is a two-tier structure at the national level. This would involve the creation of a new organization with authority and funds to establish and coordinate the few fundamental programs that are best handled at the national level. The separate governing bodies of these programs would constitute the second tier. The first operating responsibility of a coordinating agency (a kind of national library board) would be to establish the periodicals center whose governing body would be responsible to the board through an executive director's office. This proposed governance structure, though an integral part of the plan, does not predetermine the specifications for the NPC itself.

As proposed in the plan, the National Periodicals Center will contain a centralized collection of periodical literature directly accessible to libraries throughout the nation. Initially projected at 36,000 titles, subscriptions for which would be generated as quickly as possible, the collection would continue to grow prospectively (adding more titles) and retrospectively (acquiring back files) according to an established strategy and in as timely a fashion as possible. All subject areas would be included with the initial exception of clinical medicine. Eventually the collection may number in excess of 60,000 current titles, but it will never contain all of the estimated 200,000 currently published periodicals. Though few of those not held by the NPC are likely to be in great demand, it is planned that the NPC would provide access to many of them through a system of referral libraries. The NPC will contract with referral libraries to provide service to requesting libraries that desire specific titles not in the NPC collection. All requests would be channeled through the NPC to assure uniformity of procedure and to provide the means to monitor system performance.

The NPC will develop and make available a finding tool to identify the titles and holdings to which the NPC can provide access. The finding tool will be organized by key title and International Standard Serial Number (ISSN) and will include titles available from both the NPC collection and the referral system libraries. For the first several years libraries will be required to request only material listed in the

tool. Each order will have to include the ISSN or an NPC-generated substitute number and the key title.

The most important question for many librarians is which libraries will be able to go directly to the NPC. After a break-in period for the NPC and after the collection is well established, all libraries will have access. The decision to use the NPC or alternatives such as local, state, or regional resources should be based upon the actual dollar cost of the transaction and the reliability of access or delivery.

Several fiscal considerations will aid libraries in making these sorts of decisions. First, any library or consortium wishing to have access to the NPC will be required to establish a deposit account equal to the institution's expected request activity for one month, with some arbitrary minimum required. Second, a price schedule will be established that takes into account the copyright status of a particular item, its age, and the frequency with which it is requested. All NPC transactions will require the payment of a fee, part of which will be used to defray any legally required copyright fees or possible sales fees. Librarians using the NPC will be assured that for any item received from the center, the appropriate fees will have been paid. This will relieve libraries of some of the requirements established by the CONTU (National Commission on New Technological Uses of Copyrighted Works) guidelines.

Quite apart from the procedures to comply with the copyright legislation, it is imperative in the interest of effective scholarly communication that the NPC develop effective relationships with the publishing community. It is proposed that the NPC become a kind of service and fulfillment outlet for at least some publishers. Thus the NPC might provide a back-issue service (probably in microform), an article sales service (so long as the article remained protected by copyright), an outlet for on-demand publishing, and/or a source for the full text of material published in synoptic form. All of these services would generate some income for publishers while providing the access to material that library users need. It is recognized that a relationship of this kind may tend to modify traditional information production and/or distribution functions. But each element of the information

chain has a unique and valuable role to play in serving the needs of inquiring scholars, and each must be supportive of the other.

The internal structure of the NPC will be organized to achieve fast internal processing so that requests will be filled within twenty-four hours of receipt. Much of the most active collection will be stored in microfiche because this is the fastest request fulfillment mode of storage. Other less heavily used materials will be stored in their original form and retrieved for photoduplication. Most requests will be filled with paper photocopy; microfiche will also be available at an enticing discount.

Requests will be handled in as simple and direct a manner as possible. Libraries will be encouraged to transmit requests to the NPC in electronic form so they can be received, verified, and forwarded to the fill site by machine. For items not in the NPC collection, the machine system will batch and transmit requests on a scheduled basis to appropriate referral sites. "Picking slips" for requests to be filled at the NPC will be automatically generated and directed to the appropriate storage site for fulfillment. After copies are made they will be packaged - probably in a plastic wrapper with the picking slip now used as the address label. First-class mail will be used to send most requests. Other rapid transport systems (air freight/express) may be used to move mail into the U.S. Postal Service's one-day delivery zones. Some institutions with the capacity to receive material via facsimile transmission may choose to pay the higher costs of this delivery mechanism.

A peripheral but nonetheless vital objective of the NPC is to participate in the national preservation program. Consequently, all materials received by the center will be handled in such a way as to assure access for as long as possible. The costs of preservation are high but must be assumed as part of the effort to provide effective access to periodical literature in perpetuity.

The cost of the NPC must eventually be covered by a combination of federal subsidy and user fees. However, the start-up costs must be fully subsidized for at least the first three years. First-year costs will be

$3,750,000 and will cover the basic organization of the NPC and the first-year collection costs. Second-year costs rise to $4,850,000 and cover the costs of the second-year collection development effort as well as the costs of bringing all systems up to an operational level. Third-year costs rise to $5,450,000 and are only minimally offset by transaction receipts. This year is a break-in year for all operating systems and as such is expected to produce only marginal levels of activity and therefore income. Beyond the fourth year (basic operating cost $1,925,000) costs will become more directly related to the level of request fulfillment activity. However, in order to achieve full preservation microfilming, a $3,000,000 subsidy is required in year four. The annual subsidy should then decline as request fulfillment activity and income rises in each succeeding year.

The site of the NPC is dependent upon the quality of all relevant and available communications systems, availability of power and other utility services, and an adequate pool of manpower. The plan recommends new construction in order to avoid reducing the efficiency of NPC functions by forcing them into inappropriate spaces. The cost of construction for a building for the NPC should be $5.5 - 6.5 million for 130,000 net square feet. Construction funds should be available during the first year. Construction should proceed fairly rapidly since the building required is a simple modular warehouse facility. The most complicated features of the structure relate to the specific environmental requirements.

Upon acceptance of the technical development plan three separate kinds of activity should proceed simultaneously. The first involves the establishment of a legal basis and funding support for a national library board, the first operating responsibility of which would be the National Periodicals Center. Second, a senior executive with necessary secretarial and travel support should be charged with the responsibility of explaining the plan for an NPC to the library, publishing, and scholarly communities. This individual would provide a focus for the comments and suggestions that are bound to be generated by the circulation of the technical development plan. The third activity, which will require establishing a core of two or three permanent NPC staff, is

to continue the detailed planning for the NPC, including identification of first-year titles, identification of appropriate back files, identification of any existing computer operating systems that might be appropriate for anticipated NPC activities, and the preparation of specifications for systems that will be required. These are important tasks that would accomplish two things: (1) provide a running start for the NPC operation and (2) demonstrate to the Congress that the library community is serious about and committed to a national periodicals center.

The creation of a national periodicals center will require the cooperative action and support of librarians, information scientists, publishers, politicians, foundation managers, and the eventual NPC staff itself. One thing is clear. Society has everything to gain from an improved capacity to retrieve and use the information generated by its members. A coherent national periodicals program should provide such an improvement. A national periodicals center is the first step.

BACKGROUND

The development of a technical plan for a national periodicals center is the most recent step in a movement initiated by concerned librarians to resolve a conflict that has reached critical proportions. On one side of the conflict is the desire of publishers, librarians, information scientists, and others in the dissemination field to provide the user population with full and equal access to information. On the other are the present-day economic realities of library operations. With their budgets declining in purchasing power each year, libraries are losing ground in the effort to provide even a fixed portion of available information sources. While this situation affects libraries and information services of all types, its most serious impact is on academic and research libraries, which are hard pressed to meet the demands placed upon them by students, scientists, and other scholars.

Interlibrary loan (ILL) is the mechanism by which most libraries have attempted to increase access for their users to a wide range of materials beyond local resources. First proposed around 1875, the ILL system was founded on the principles of courtesy and noblesse oblige with the assumption that most libraries would lend as much as they borrowed. In 1917 enough lending was taking place for the American

Library Association to formulate the first National Interlibrary Loan Code, one goal of which was "to augment the supply of the average book to the average reader." Gordon Williams has traced the history of this code through its several revisions, noting how it became more and more restrictive as the effects of an increasingly heavy ILL traffic on libraries became known.(96) These restrictions were added reluctantly in an attempt to distribute ILL traffic more equitably. Service-oriented librarians did not find it easy to accept the fact that the premise of reciprocity, on which ILL activity was based, was a false assumption. In actuality, the largest libraries were doing most of the lending (from three to ten times as much as others) at greater and greater cost.

Interlibrary Loan: The Current Environment

From several useful studies conducted in the last ten years a picture of the interlibrary loan world and its problems has emerged. It comes as no surprise that the flood of information rising at the end of World War II has not abated. In the area of scholarly and research journals Fry and White determined that during the period 1969-1973 two journals started publication for every one that ceased.(26) Materials in science and technology have demonstrated the greatest boom. Between 1950 and 1974, for example, the number of U.S. scientific and technical books published rose 327 percent, while the number of journals alone rose nearly 31 percent.

The sheer increase in quantity tells only half the tale, of course, for the characteristics of the publishing process have caused prices to rise even more rapidly than inflationary rates, particularly in the area of science and technology. For the same 15-year period cited above, the average price of a book in the field rose 116 percent. This may seem high enough, but the average annual journal subscription rose from $5.30 to $20.10 -- an unprecedented 279 percent.(40) In 1976 an annual subscription to a physics journal, the most expensive category, could cost libraries anywhere from $7.50 to $1,540.80.(17) Not only are library budgets not keeping pace with costs, but the

percentage of those budgets available for purchase of materials (as opposed to salaries and equipment) is decreasing.

At the same time that the quantity and cost of materials are rising, demand is increasing. Improved bibliographic access, principally the result of the growth and availability of computerized data bases, permits users to gather citations and references to materials of interest more quickly and in greater quantity than ever before. But libraries -- particularly the smaller ones -- that subscribe to these data bases may not have many of the cited documents on hand. This throws the burden of lending even more heavily on the larger collections at a rate that most likely will continue to expand.

What measures have net-lender libraries taken to cope with this crisis? Some now charge fees for lending to recover at least part of the fulfillment costs and to control demand. Others are adding or tightening restrictions on lending, perhaps making only certain kinds of libraries eligible. Some have adopted more subtle measures, such as lowering their priority for filling requests thus increasing the turnaround time so that only the most serious users will persevere. In a more positive mode, many libraries have formed local or regional consortia and networks with formal agreements as to lending and borrowing policies. Examples of these are the NYSILL (New York State Interlibrary Loan) network, MINITEX (Minnesota Interlibrary Telecommunications Exchange), and the ACM (Associated Colleges of the Midwest) Periodicals Bank. Often the consortia involve libraries of various kinds. Some, such as the Regional Medical Library Program or the Center for Research Libraries, operate on a national basis but either handle only materials in a specified field or serve a restricted set of members.

Periodicals: A Generic Problem

Almost half the requests for interlibrary loan in the United States are for periodicals.(61) Indeed, it is this category of material that is swallowing an increasing portion of library materials budgets, particularly in academic and research libraries and large

special libraries. Fry and White's three-year analysis established the fact that serials budgets in academic libraries increased at a rate more than twice that for all other materials, a reflection of the 53 percent increase in the median price of periodicals during the same period.(26) To cope with this, libraries have been transferring funds earmarked for book purchase to the periodicals budget and are cancelling duplicate subscriptions and those subscriptions considered locally to be less significant. New titles are selected on the basis of anticipated demand, which is often difficult to predict. A few libraries may coordinate this effort with other local or regional libraries in an attempt to ensure access to the largest possible number of titles. But for many libraries these are unilateral decisions, the end result of which will be to severely restrict access to periodicals for a large number of users.

The causes of poor access to periodical literature cannot be laid simply at the door of rising costs, nor can the problem be included as just another in the list of ills that beset the present interlibrary loan system. Although libraries use ILL procedures to handle periodical loans, it is not these procedures alone that inhibit access to periodical literature. Their use, however, tends to highlight the problem and, since they are so visible, deflect the search for solutions into an examination of the procedures themselves. In actuality, the basis of the access problem lies in the generic nature of periodicals -- the way they are published and distributed and the way libraries acquire, process, and store them. Thus access to periodicals is not just a library problem. Libraries constitute only one link of the chain that involves the publication, distribution, and storage of information.

The evidence is substantial that libraries initiate a large number of requests for articles in journals to which they already subscribe. This has nothing to do with ILL procedures but is a matter for consideration by publishers as well as libraries. A library will initiate such a request, in many instances, when an issue fails to arrive or is lost soon after arrival. Unfortunately, it is often not possible for the library to replace that issue, especially if the loss goes undetected for several months.

The primary concern of many publishers is the initial distribution of the periodical to subscribers or, in the case of society publishers, to members. Publishers tend not to stock back issues because of the cost of inventory, and they generally do not reprint them. Reprint and microform publishers have taken advantage of the resulting market for back files. However, these publishers quite naturally choose to handle only those back files that are in heavy demand, packaging them as complete volumes or by the year, which does little to help the library that needs only a single issue.

Another problem of access rests squarely on the manual record-keeping procedures in many libraries, procedures that make it impossible for them to maintain a current and precise inventory of their own holdings. Checking the shelves against records of receipts is rarely done because of the cost; thus gaps in a periodical run may not be known. Articles may be unavailable to users because pages have been torn out of an issue or a volume has been otherwise damaged. A title or issuing body may change, causing misshelving before records can be altered. And, of course, issues may be taken out of circulation because they have been sent to the bindery. These and similar problems hamper the reliability of a library's internal knowledge about the status of its collection and, as before, have nothing to do with ILL procedures or rising costs.

In any event, whether a library wants to replace an issue it supposedly owns or provide a patron with an issue of a journal it cannot afford to buy, the only options it has available are to ask another library for a copy on loan or to seek the item in the commercial document delivery market -- often a slow and fruitless process.

It is when libraries attempt to apply interlibrary loan procedures to periodicals that generic problems immediately become obvious. If a library does not have a complete and accurate inventory of its own periodical collection, it cannot assure a borrowing library that it has available even those items to which it subscribes. Further, while books have single, often unique, titles, periodicals frequently have similar titles and are identified by individual libraries in a variety of ways. Although a succession of standards for the identification of serials has

been developed over the years, libraries as a group have failed to apply any of them consistently. Locating the precise title needed becomes quite often a guessing game.

To attempt to improve access to periodical literature by considering the matter as primarily an interlibrary loan problem, therefore, may be misleading. What is needed is a new equation, one that will improve access to periodical literature in the aggregate, whether the items sought are heavily used and widely owned or not. Such an equation must involve the authors and publishers and protect their rights while simultaneously increasing the availability of their products to all. To do this successfully, it must also address the problems associated with the distribution and inventory of periodicals, thereby strengthening all the links of the information chain.

A National Periodicals Center: A Partial Solution

As the problems associated with periodical collections have increased, the need for an effective national system to improve access to this material has come to be considered a preeminent requirement by experts in the library community. The Association of Research Libraries (ARL) undertook the first major step in 1970 when it began to sponsor a series of investigations of academic interlibrary loan activities on a national level. These studies, supplemented by others conducted by the Center for Research Libraries (CRL), provided basic data on the magnitude, characteristics, and costs of interlibrary loan and explored various alternatives for improving the handling of periodical loans. Subsequently, the National Commission on Libraries and Information Science (NCLIS) funded a study of the role of resource and bibliographic centers in a national network for all types of library materials including periodicals. This study confirmed conclusions drawn earlier -- the best method of improvement was the creation of a single comprehensive periodicals center on the national level.

This view has been further corroborated by the reported success of the British Library Lending Division (BLLD), a centralized interlibrary loan facility serving the United Kingdom, which received over 2.5 million requests in 1976-77. Over 20,000 of those requests came from research libraries in the United States through the Center for Research Libraries. A good portion of the material requested through CRL bore a U.S. imprint.

In April 1975 NCLIS held a two-day conference to which representatives of the library community were invited to help NCLIS decide on the next steps to take. The result of that meeting was the appointment of a Task Force to prepare a plan for a national periodicals system. Its work was concluded when NCLIS accepted its report, Effective Access to Periodical Literature.(55)

The Task Force considered alternative approaches to a national periodicals program or system and recommended a three-level plan. Level 1 was defined as collections of heavily used periodicals maintained by local and state libraries and regional library systems; these collections would meet a substantial portion of local users' requirements. Level 2, at least initially, was conceived of as a single national periodicals center (NPC) housing a comprehensive collection dedicated to lending and a photocopy service. This collection would meet the majority of requests not filled locally. Finally, Level 3 was seen as the collections of the national libraries and other major research and specialized libraries, which would back up the NPC for uncommon current titles and for older material.

It was the Task Force's view that the national periodicals program, of which a national periodicals center would be an integral part, would perform a vital national service to scholars, researchers, and others who use libraries. Users would find it much easier to learn what material is available and where it is located. They would also have options as to type of service, format, and delivery -- depending on their needs and circumstances. Libraries could expend their funds for those resources they know are of most use to their particular patrons and would be in a position to share their unique collections more effectively on a national basis without unduly hampering their primary

services to local users. Finally, within the framework of a coherent national periodicals program, constructive ways could be devised to improve each step in the preparation, publishing, abstracting and indexing, bibliographic identification and control, and distribution of periodical literature, thus improving access to its contents for the nation as a whole.

Two levels of the proposed national periodicals system are essentially in place. The missing element is the national periodicals center. The Task Force recommended that the Library of Congress (LC) assume responsibility for developing, managing, and operating such a center. In late 1977 the Library asked the Council on Library Resources, Inc. (CLR) to undertake the preparation of a detailed implementation plan for a national periodicals center including a description of the technical requirements necessary for such a center, such as equipment, personnel, services, collection, management, data processing support systems, schedules, prices, costs, and location and design of a facility.

The planning team began work in November 1977. Three studies published since the NCLIS Task Force report have added to the data utilized during the course of the plan's preparation. Library Photocopying in the United States and Its Implications for the Development of a Copyright Royalty Payment Mechanism, prepared by King Research, Inc. and jointly sponsored by NCLIS, the National Science Foundation (NSF), and the National Commission on New Technological Uses of Copyrighted Works (CONTU), provided valuable data on the amount of journal photocopying undertaken by libraries at present.(41) CONTU itself commissioned another study, Costs of Owning, Borrowing, and Disposing of Periodical Publications, to update data published by Gordon Williams in 1968. In general, this study confirmed the earlier data and determined that "costs on both sides of the decision -- owning versus borrowing -- have apparently escalated [at] about the same [ratio]."(63) Another study, performed at the University of Pittsburgh and funded by the National Science Foundation concerning the actual use of a university library collection, affirmed earlier reports that a high percentage of journals used by all categories of patrons is related to a

very small portion of the total journal collection.(64)

To assist in preparing the plan the team consulted with many individuals. Visits were made to institutions and headquarters of networks that currently handle a significant volume of periodical loans. While previous studies had considered available data with a view toward determining a suitable system for handling periodicals, this report describes the technical details of and procedures for operating a centralized periodicals loan facility. The following chapters provide what is considered the minimal requirements to establish and operate a national periodicals center. Although the planning was undertaken at the request of the Library of Congress, the report is a CLR document and is designed to be useful to any agency or organization that ultimately assumes the responsibility for bringing the NPC into being. Further, because periodicals are but one of several categories of material that might be provided through a national effort, prospects for providing access to other categories of material are not precluded.

GOAL, OBJECTIVES, AND OPERATIONAL REQUIREMENTS

The proposed solution to the problem of poor access to periodical literature, as discussed in the previous chapter, is the establishment of a new element in the information delivery chain - a National Periodicals Center. This chapter contains the recommended goal, objectives, and operational requirements of such a facility.

Goal

The overall goal for the national periodicals system, as stated by NCLIS in its document Toward a National Program for Library and Information Services: Goals for Action and adopted by NCLIS in its Effective Access to the Periodical Literature: A National Program, is:

> "To eventually provide every individual in the United States with equal opportunity of access to that part of the total information resource which will satisfy the individual's educational, cultural and leisure-time needs and interests, regardless of the individual's location, social or physical condition or level of intellectual achievement."

In line with this overall goal, the goal of the National Periodicals Center is:

To improve access to periodical literature for libraries and thus to individuals using libraries.

The NPC will accomplish this by:

1. Providing an efficient, reliable, and responsive document delivery system for periodical literature;

2. Establishing effective working relationships with the publishing community; and

3. Helping to shape a national library system through its operating policies and procedures.

Objectives

The NPC must be established and operated in such a way as to accomplish the above goal without detrimental effect on the fundamental contributions of the existing information delivery chain. The resulting objectives are:

1. To provide a reliable method of access to a comprehensive collection of periodical literature.

While the capacity to meet demand is a function of the manner in which the collection is developed, the NPC cannot limit its service to the most heavily requested materials. Comprehensiveness has to be the long-term aim. There are also preservation implications which will be discussed later.

2. To reduce the present overall cost of acquiring periodical material requested via interlibrary loan by assuring access to that material.

This implies a more efficient method of acquiring desired material after the initial distribution via subscriptions. Once the National Periodicals Center is in place and operating, each library should find it easier to acquire needed material from this document delivery system. Eliminating the guesswork and redundancy that plagues the present ILL process will reduce total ILL costs.

3. To reduce the time required to obtain requested material.

Closely linked to Objective 2 is the rapidity with which the NPC will respond to requests for material. High speed transmission of requests, fast internal processing, and a reduction in delivery time will lower the overall time presently required to complete an interlibrary loan transaction.

4. To assure that for every document delivered through the NPC all required copyright fees and obligations are paid.

The NPC will establish relationships with publishers that will relieve requesting libraries from the obligations required by the CONTU guidelines covering photocopy of copyrighted material for ILL purposes. Thus libraries will not have to maintain ILL request records for items sought from the NPC collection. Prudent library managers will want to identify titles frequently requested, of course, and determine whether it would be more efficient and cost effective to acquire and maintain them locally.

5. To act, under appropriate conditions, as a distribution agent for publishers in order to provide the services that some publishers are unable or do not choose to provide.

This suggests that the NPC may become a retail outlet providing on-demand distribution of a variety of requested materials, which otherwise may be unavailable. It also implies that the NPC will become a source of revenue for the publishing community.

6. To provide libraries with additional options as they establish their own collection development and maintenance policies.

By its own policies and procedures, the NPC will not discourage local periodical acquisitions via subscription. Local decisions concerning periodical collections must be made in light of local priorities. The very existence and dependability of an NPC, however, is bound to be an element to be considered. Decisions that concern collection development are often based on anticipated local use or demand. Since demand decays with age of the issue, local retention and related preservation practices can be altered if there is some assurance of continuing ready access to specific titles. For example, a library might reduce the amount of binding now necessary to protect single issues and use the money thus saved for additional subscriptions or for maintaining those that increase in cost. A dependable NPC should improve the ability of local libraries to make rational, cost-effective decisions about the nature of their periodical collections.

7. To promote the development of local and regional resource sharing.

The NPC could not absorb all of the existing request traffic even if it had the capacity in terms of collection to do so. It will, through the regulation of access to the most heavily requested materials, encourage the development and use of local and regional resources. At the same time, however, the NPC will function as a

reliable backup for these resources. In the long run, the NPC and local/regional ILL networks will survive only if they provide library users with a practical means of access to materials they require.

8. **To contribute to the preservation of periodical material.**

In order to ensure continued access over time, the NPC must pursue sound preservation practices. This implies not only the assurance of proper environmental conditions for collections and the conversion of certain materials to more stable media, but the collection and preservation of complete back files as well. The ruling principle will be the preservation of a publication's content, not of its format. The preservation activities of the NPC should become an integral and dependable part of a national preservation program.

9. **To provide a base for the development of new and imaginative publication strategies.**

This is a long-term objective with two obvious possibilities at present: 1) a synoptic journal with an article distribution service, and 2) an on-demand publishing service. The NPC will be ready and eager to cooperate with any publishers who might be interested in exploring such alternatives to traditional publishing methods. It is reasonable to envision the NPC as the distribution element in a number of these publication alternatives.

10. **To provide a working example of a major, dynamic, national access service that might serve as a prototype for categories of material other than periodicals.**

While this plan is focused on periodicals, it is probable that other categories of material might well be included in a future lending library system.

Operational Requirements

Given the goal and objectives stated above, the NPC must operate within certain constraints and utilize existing resources. Therefore, the NPC must:

1. **Operate as cost effectively as possible.**

This implies a careful analysis of each element of the operation. The technologies employed will be off-the-shelf, which may mean a heavy reliance on computer-assisted request processing and record keeping. Whether manual methods should be replaced by machine methods, however, will be determined by relative costs, not the availability of technology. There is no intent to automate procedures regardless of cost.

2. **Be able to expand in response to increasing demand.**

This requires a modular design of all NPC manual and computer systems.

3. **Fill 90 percent of all valid requests within a 24-hour period or one-working-day cycle.**

This will require the publication and distribution of a finding tool and the limitation of requests to items cited therein. As soon as the NPC has the capacity to fill or refer a higher proportion of the national request traffic, consideration will be given to an operating mode that would accept <u>all</u> requests for periodical literature whether or not the titles requested are listed in the finding tool.

4. Prepare a collection development strategy that will give the NPC the capacity within five years to service 50 percent of all ILL requests for periodicals.

This does not mean that 50 percent of all requests will be directed to the NPC; it does mean that the NPC collection would have achieved sufficient depth to satisfy 50 percent of the total ILL traffic generated in the country. Though much of this traffic will be filled via local sources, the object is to have the capacity to provide backup for this portion of the traffic.

5. Develop a referral system as a backup to the resources of the NPC in a manner that is compatible with its own operations and is as transparent as possible to the requesting institutions.

6. Develop the ability to analyze the nature of the request traffic so as to predict load levels and to adjust internal procedures to meet the anticipated demand. The analysis should also provide data on what titles to acquire, both current and retrospective.

7. Develop mutually acceptable working relationships with publishers, including microform publishers.

8. Capitalize on existing and developing sources of bibliographic data, e.g., CONSER (Conversion of Serials project), ISDS (International Serials Data System), abstracting and indexing services, etc.

9. Establish an incremental pricing policy based on a number of characteristics, including age of and demand for the title requested as well as its copyright status.

The establishment of an incremental pricing policy is an attempt to regulate the flow of traffic to the NPC and to compensate the publisher for requests that otherwise might be considered a circumvention of subscription costs. Further, it is hoped that such a

policy would encourage the development of local and regional collections of heavily used material, which would satisfy a substantial portion of user demand.

10. **Establish a basic NPC processing fee that will provide partial cost recovery.**

After a sufficient load level is achieved, the processing fee ultimately should cover most of the costs of processing and filling the request.

11. **Rely on federal funding and other subsidies to support capital costs including collection development and preservation.**

12. **Have the capacity to be flexible and susceptible to operating adjustments and revisions in order to achieve its objectives.**

The NPC will most certainly operate in a dynamic, changing environment. Every operating element of the NPC must be amenable to change in response to that environment. Because of its innovative nature, the NPC's continued viability will hinge on its capacity to adjust operations and policies as experience dictates the wisdom of such changes.

ACCESS TO THE NPC

The primary goal of the National Periodicals Center is to improve access to the world's periodical literature. To accomplish this the NPC will deliver requested material as rapidly as possible, given the limits of technology and the costs of employing that technology.

It will take time to assure access to a major portion of the world's periodical literature. The methods to be used to move toward this objective are outlined in later chapters on collection development and the referral system. It is the intent of the collection development strategy to establish a collection that at the end of five years will satisfy 50 percent of all the ILL requests generated in the country. This strategy does not take into account the possible impact of gifts of periodicals on the NPC's ability to provide access to information.

The NPC collection will, of course, continue to grow beyond the fifth year. Prospective as well as retrospective collecting of periodical literature will continue. With time the NPC will be able to provide access to more and more of the periodical universe through its own collection and referral library resources.

The speed of delivery of requested material is limited by factors that include certain technological elements. Facsimile transmission is possible and will be explored with those institutions willing to pay transmission costs. At this point facsimile transmission requires substantial capital expenditure on both transmitting and receiving ends. Further, it involves high labor and line costs because of the slow transmission rates of present off-the-shelf equipment. However, in view of the expectation that progress toward more rapid transmission rates will be made, the NPC will continue to evaluate this means of document delivery.

For the most part first-class mail will be used as the preferred means of delivery. However, where a speed advantage can be gained, the NPC will use commercial delivery services, bus, air freight, or a combination of these modes to reduce delivery delay to a minimum. The costs of delivery will not necessarily dominate such decisions; instead, costs will be weighed carefully against the actual reduction in delivery time.

Thus far the NPC has been viewed as a national effort. There is much to be gained, however, by expanding the support and service base to include both Canada and Mexico. Should those sovereign nations determine that they would like to have a stake in this institution and its service and should they participate in subsidizing the project, it would be reasonable to call the expanded institution the North American Periodicals Center. For purposes of this technical development plan, however, and until such interest and subsidy commitments are made, the institution will be referred to as the National Periodicals Center.

Structure of the Access System

Initially at least, the three-tier document delivery structure as defined in the NCLIS report, Effective Access to the Periodical Literature, is a convenient means of describing the access system. Of the three levels only the local level is really in place -- it is

represented by the status quo. The National Periodicals Center does not now exist in any form other than as the concept illustrated in this document. The referral level exists to the extent that there are national and research libraries with distinctive subject collections, but there is as yet no reliable means of identifying which libraries have what specific items. A major advantage to be derived from the operation of an NPC as herein described is the identification and specification of the exact locations of highly specialized periodical resources and an assurance of access in perpetuity to those resources.

The NPC will, as stated earlier, perform a central role by providing efficient access to its own collections and to the resources of referral libraries. The present guessing exercise that now characterizes much of the ILL traffic in the U.S. will be minimized. The entire structure of the proposed national periodicals system is designed to serve the unique needs of inquiring individuals, scholars, and research personnel. Though it is hoped that these individuals will be aware of the national periodicals system as a mechanism to assure access to the periodical literature, it is planned that the operational detail will be transparent to the individual generating the request.

Local-Level Relationships

First, a caveat. It is not the province of this technical development plan to redesign or restructure the "local" level, which consists of existing ILL networks, consortia, and individual libraries. Ultimately, the NPC will be capable of serving the special needs of all of these entities. It is important to underscore that the development of local or regional networks -- or their failure to develop -- is solely the option and responsibility of the libraries involved.

At present a wide variety of these regional, state, and local ILL networks are in operation. There are also many libraries not yet served by a network specifically organized for ILL purposes. For the immediate future it seems important that the existing networks both continue and improve their present levels of service. It will also be helpful if

libraries not now served by effective ILL networks can organize a local means of meeting their pressing needs for the most heavily requested titles.

A second caveat also needs to be stated clearly. It is not the intent of the NPC to disrupt any effective local document delivery or ILL service. It is conceivable, however, that the NPC could become so effective in responding to requests that the continuation of an existing ILL network might properly be questioned. Thus, the rationale for that network's existence would no longer seem to be valid. After the NPC has had operating experience in the U.S. document delivery environment, it may under certain conditions prove desirable to displace some local ILL networks and/or consortia. For the immediate future, however, networks with slow, laborious response times and mechanisms should make every effort to improve their performance. This should be viewed not as a response to NPC performance pressure, but as a response to the pressing needs of the ultimate user - the library patrons of the nation. The lessons that will be learned at the NPC, particularly in the area of communications, may assist local networks to become more responsive to the demands of the ILL system.

The NPC will actively encourage the development of local ILL networks, primarily through the establishment of fiscal incentives. The most important of these will be an incremental pricing policy and the use of deposit accounts.

Deposit Accounts

Any library or consortium wishing to have access to the NPC will have to establish a deposit account equivalent to the institution's expected request activity for one month, with some arbitrary minimum required. The minimum deposit may encourage libraries to seek access to the NPC via a group structure if they do not anticipate heavy use of the NPC as individual institutions. It is conceivable that groups of this sort could spring up specifically to reduce the effect of the deposit account requirement and gain access to the NPC for a number of small libraries.

Pricing Schedule

Although federal funding and other subsidies will be required to support capital costs of the NPC, a pricing schedule will be necessary to provide partial cost recovery for operations, to compensate copyright holders, and to regulate the flow of traffic to the NPC. Prices per document will vary according to a number of characteristics, including the age of the item, its copyright status, agreements with publishers, format requested, etc. The chart on page 26 outlines a proposed basic pricing schedule. Details of the sales fee are discussed in the chapter "NPC-Publishing Community Relationship."

The base cost of an item requested from the NPC is represented by Category A in the chart -- material not covered by copyright, out-of-copyright material, and copyright material for which no fee is required by the publisher. This cost is the NPC processing fee, which will likely be set initially at $3.00 to $3.50.

Category B -- copyright material published more than five years ago and still covered by copyright -- will be furnished for the NPC processing fee plus one-half of the copyright or sales fee. As the chart indicates, the copyright or sales fee declines as the age of the document passes the five-year (60 month) mark.

For copyright materials published in the last 7 to 60 months -- Category C -- the cost will be the NPC processing fee plus the full copyright/sales fee which will be established at a standard rate -- perhaps $2.00 -- in order to simplify record keeping. The fees actually paid by the NPC for these transactions may vary by title, but the fee charged the requesting library will be standardized. As experience is acquired, NPC management will adjust this figure in order to minimize the cost per request and still cover the aggregate cost of the copyright/sales fees.

Category D is the same as Category C except that these titles are heavily used.* To encourage the development of local, state, and regional resources for these most frequently requested titles, the NPC will fill requests for this material for the NPC processing fee, the copyright or sales fee, and a premium.

The premium is intended to do several things. First, as already mentioned, it should stimulate local libraries to provide local access to items that are most frequently requested in order to avoid the NPC premium charge. Second, it should reduce the demand upon NPC resources and thus allow the NPC to concentrate on the rapid delivery of less heavily requested materials. Third, the premium will encourage libraries to evaluate a variety of sources for heavily used material including the commercial (for profit) document delivery services. The intent is not for the NPC to compete with these services on a price basis but to set a standard of performance that will stimulate improved response times from all sectors of the document delivery community.

Requests for copyright material published within the most recent six months, Category E, will be governed by an entirely different set of circumstances; for all practical purposes the NPC will not routinely provide access to such materials. Instead, it will attempt to provide a sales service. When possible, the NPC will provide copies of entire issues, often on microfiche, on a purchase basis. The cost will be one-half the NPC processing fee plus the full hard-copy issue price. In this way, the NPC will not jeopardize unduly the publication of scholarly material. Rather it will provide an option for libraries that need access to current material and at the same time promote rational local acquisition and selection policies.

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*Though it is estimated that there are 3,000 heavily used titles, there is nothing magic about that figure. In actual practice, the number might drop to as low as 2,500 or rise to 3,500 or more. The actual number will be determined by counting the titles that constitute 50 percent of total requests. NPC management must have the option to adjust this figure as demand patterns change in order to accomplish the objectives of this pricing mechanism without undue damage to the general access objectives of the NPC.

The NPC can sell issues published in the last six months only after an appropriate relationship is established with the publisher involved. Such relationships should be viewed by publishers as an income opportunity since a substantial portion of the sales charge will revert to them. Thus the publishing community stands to increase revenues by using the NPC as a sales agent (see "NPC-Publishing Community Relationship").

Category F -- those requests that must be sent on to a referral library -- will be considered library-to-library requests. Since these requests are therefore subject to whatever CONTU guidelines are then in effect for assessing the need to pay copyright royalties the costs will not include any copyright or sales fee. The finding tool will designate the material that will routinely be forwarded to the referral libraries so that requesting libraries can determine when the CONTU guidelines apply to requests addressed to the NPC.

These pricing/sales policies will present some real dilemmas for libraries and their constituencies. Should a library, for example, spend its limited funds to purchase and maintain certain periodicals on site? Or would it be more economical to pay for remote (yet rapid) access to the same titles on a per-use basis? These dilemmas are not new, but the NPC may highlight them more vividly for all concerned. Williams (97) and, more recently, Palmour (63) have analyzed the costs of owning, borrowing, and disposing of periodical titles. Their studies contain valuable information to assist individual libraries in making judgments as to what they should buy, borrow, or discard given their own fiscal constraints and program requirements. The options are and must remain local, but assistance in the evaluation process may be an appropriate supplemental role for the NPC.

PROPOSED NPC PRICING SCHEDULE

CATEGORY DESCRIPTION	ACCESS FEE
A. Material not covered by copyright, out-of-copyright material and copyright material for which no fee is required by the publisher	NPC processing fee only.
B. Copyright material published more than five years ago and still covered by copyright.	NPC processing fee plus one-half the copyright or sales fee.
C. Copyright material published in the last 7 to 60 months - less than heavily requested.	NPC processing fee plus copyright or sales fee.
D. Copyright material, heavily requested, published in the last 7 to 60 months.	NPC processing fee plus copyright or sales fee plus heavy-use premium
E. Copyright material published within the last six months. Handled only if a sales relationship exists between the NPC and the publisher.	Full issue sales price plus one-half the NPC processing fee.
F. Categories B, C, or D that for some reason must be transmitted to a referral library.	Same fees less the copyright or sales fee.

Because operations like the NPC have few precedents in the United States, CONTU did not provide copyright guidelines for them. It is assumed, however, that responsibility for copyright adherence will rest with the NPC. Thus, whether NPC transactions are finally considered as sales on behalf of the publisher or as interlibrary loans, libraries

using materials in the NPC collection should not have to count such requests as part of their CONTU guideline quotas for specific titles. This is especially true if the transactions are considered as sales. It is also true whenever the NPC pays for copying privileges. This may appear on the surface as a powerful argument for using the NPC to the exclusion of local networks and resources, but the fees and sales charges will tend to counterbalance this argument. Because of the present copyright law it will be advantageous to develop specific operating agreements between the NPC and copyright holders. These agreements will accrue fiscal benefits to the copyright holders and access benefits to the users of the National Periodicals Center.

Availability of the NPC to Libraries

The single most important question for many librarians is: "Which libraries will be able to go directly to the NPC?" After a break-in period for the NPC and after the collection is well established, all libraries will have direct access. But direct access may not be the most reasonable approach for a particular library. If local resources can fill the request, those resources should be used. If the local resources are available only after some delay and the need is urgent, then the NPC may be the appropriate source. The decision about whether to use the NPC or local alternatives should be based upon the actual dollar cost of the transaction as well as upon the reliability of access or delivery. Local resources are likely, at least in the beginning, to have a quicker actual delivery time once the desired item is located. Whether or not the internal procedures at the local supplying library are rapid enough is another issue and will depend on the library in question.

Realistically it is not possible at this time to provide all libraries in the country with equal access to a national periodicals center. The realities of geography and the economics of communication introduce inequities that are not easily resolved. If one opts for

facsimile transmission of material, one has to consider that those transmission costs are affected by distance. The same is true of incoming communications to the NPC -- most often the cost is a function of distance. If one opts for a cost-standardized form of delivery (for example, the U.S. mail), one must consider the inequities of delivery time which are also affected by distance. As desirable as equal access may be, it is not presently feasible. What can be promised is that the NPC will make every effort to assure rapid, certain access to the periodical literature for all libraries at the least cost for each transmission configuration.

Before the NPC becomes generally available to the libraries of this country the operating systems and procedures need to be tested under gradually increasing loads. Thus it is highly desirable that the number of libraries having access to the NPC be increased gradually over a period of time. Those libraries gaining access to the NPC at the early stages will be the ones to experience the growing pains as well as the excitement of the new operation. Various operating systems will be tested. Pricing patterns may be changed to study their impact on demand, although this would occur over periods of time longer than the initial phasing period. Various forms and combinations of delivery systems will also be tested. While testing and systems development will continue as the NPC grows, the critical early phases are likely to be difficult for those involved.

The balance of this chapter suggests one of several possible configurations for starting up the NPC. An attractive alternative to the following proposal is a strict random selection of libraries during the test phases. However, it is here suggested that after the first group of libraries has been selected for access, the NPC will request each state to designate an organization (e.g., state library, library association, state commission, etc.) as the selection agency for determining the order of access of libraries within the state to the NPC. (In this plan, whenever the term "state" is used it should be interpreted as including the District of Columbia and U.S. possessions and territories.) The state selection agency will be asked to determine which of several groups or types of libraries should have access to the

NPC for the various test phases. This approach will free the NPC from the difficulties of such selection and place the selection in the hands of those most likely to be in a position to render an informed judgment. The NPC may designate additional libraries -- probably no more than 25 percent of those gaining access at each stage -- for test access during each start-up phase. There will be four stages during which increasing numbers of libraries will have access to the NPC before the door is swung open and all libraries are invited to use the NPC services directly.

The first group of libraries to gain access to the NPC will be the referral libraries plus each state library or a specifically designated surrogate. Should state or regional ILL networks be designated (as is hoped), each of them would be limited to 150 requests per day. This limit will be slowly expanded as NPC operating procedures become more settled. By the end of the proposed four phases the limit on access by networks should no longer be necessary. There will be no limit placed on requests originating from one institution. This first test period will last for at least three months. Although it is expected that the operating problems can be identified and resolved within this period, circumstances may force a management decision to extend the length of not only the first phase but of any or all of the subsequent phases. Before any new phase begins it is of primary importance that the NPC have the capacity to meet the demand requirements of the preceding phase. At the end of the first phase as many as 125 libraries/networks will have direct access to the NPC.

The second group that will be designated for access to the NPC will be the remaining U.S. members of the Association of Research Libraries and three major public libraries in each state. Once again the state selection agency may choose to include among this group various local or regional ILL networks representing the demands of the public library community. This phase is particularly important in order for the NPC to acquire some sense of the character of the ILL demand generated by public libraries. It is expected that this phase will last at least three months. Additional operational refinements will occur, though major initial problems should already have been resolved. At the

end of this stage 375 libraries will have direct access to the NPC.

The third phase is intended to assess the nature of the demand that will be exerted on the NPC by major special libraries and the federal departmental libraries. The libraries to be added in this step include the federal departmental libraries and three major special libraries per state -- the latter to be designated by the state selection agencies. As with the previous phases, the third is expected to last a minimum of three months. By the end of this period, approximately 600 libraries will have direct access to the NPC.

The fourth set of libraries to gain access will again be designated by the state selection agencies. This time eight libraries per state, libraries of all types and descriptions, will be selected for access. This phase is expected to last about three months but possibly longer as up to 500 additional libraries will now have access to the NPC.

Because the library population varies from state to state, the application of equal selection criteria to all will lead to some obvious inequities, especially in the cases, for example, of Nevada, Wyoming, Idaho, California, New York, Illinois, and Texas. Thus NPC management should negotiate or designate equalizing quotas for those states suffering underrepresentation. There seems little rationale, however, in penalizing those states with exceptional numbers of access institutions, since very shortly all libraries will have the opportunity of direct access to the NPC. As the end of the start-up period approaches, the NPC will be available to nearly 1,600 individual libraries.

By the time the fourth phase has been completed, NPC management should have accumulated sufficient operating experience to determine whether to open the NPC immediately to all libraries or whether to continue a gradual expansion of access. If more phasing-in is necessary, the state selection agencies should continue to be used to designate the libraries and their order. It is most important that the NPC be able to absorb additional loads in an orderly manner. Only the experience of the early months can provide the data upon which to base a

rational decision on this issue.

As soon as the NPC has demonstrated that it can handle the load generated by U.S. libraries, it should make plans to take its place among the major lending institutions of the world. Specific procedures to provide for foreign access should be developed. These procedures will probably involve added fees for delivery services as well as fees to help defray some of the costs of collection development. Working arrangements with the British Library Lending Division and other major international resources should be developed. Reciprocal service agreements should also be explored.

The NPC should eventually function as the national lending center for all international periodical requests and photocopy arrangements. In this capacity the NPC would establish the formal links with foreign national systems whether or not they are fortunate enough to have a central document supply system.

Requirements for Gaining Access to the NPC

As mentioned earlier, a library must establish a deposit account in order to gain access to the NPC. The NPC will provide guidance and forms to accomplish this procedure, and, once the account has been opened, will provide a manual to describe precisely the various means of access.

Initially, libraries will be encouraged to use TWX (teletypewriter exchange service), TELEX (a world-wide teleprinter system), and/or Dataphone to address requests to the NPC. A special NPC-designated format will be required so that machine systems can receive, identify, accept/reject, and redirect the incoming requests to appropriate fill sites within the NPC or the referral system.

If a library does not have access to a TWX, TELEX, or Dataphone device, requests can be directed to the NPC by mail. But because of the added costs of transcribing these mail requests into machine-readable form, special NPC request forms will have to be purchased and used.

Ultimately, access by telephone will be developed, using a system much like the airline/railroad reservation systems. A special charge may be required for this service. Tests of this and other access modes yet to be defined will be examined in limited markets to determine the desirability, acceptability, and costs of the method.

Among the access modes that will be explored at a very early stage will be one in which a requesting library can direct requests to the NPC via computer and/or computer terminal. This may be especially appealing to certain local, state, or regional ILL networks. As with TWX requests, this will require the use of a special NPC-designated format.

The NPC collection and its bibliographic records will be organized by International Standard Serial Number (ISSN) and/or key title and libraries will have to use the ISSN/key title in order to request material. The NPC will publish a finding tool containing this information for all titles under NPC control. Although other sources may also provide ISSNs and key titles, the NPC finding tool will list the most current information. It will be issued in microfiche and distributed as often as once per quarter, perhaps more frequently in the early years. When a library establishes a deposit account it will automatically receive a copy of the finding tool. To assure that the most current information is at hand, however, the library will probably want to subscribe to the tool on a continuing basis.

If a request is filled by a referral library it is likely to be filled with paper photocopy. If it is to be filled at the NPC, it can be filled either by paper photocopy or microfiche. As much of the NPC collection as is economically feasible will be kept on microfiche. Requests for material held in microfiche will be filled with a paper photocopy of the requested article unless the requesting library specifically wants a microfiche copy, for which a reduced fee will be charged. Requests for material that the NPC holds in paper form will be filled by paper photocopy for the normal charge. If a request is filled from the microfiche collection, the requesting library will get not only the requested material in paper photocopy but may receive a copy of the fiche as well, since this may be a by-product of the request fulfillment process.

NPC-PUBLISHING COMMUNITY RELATIONSHIP

The NPC-publishing community relationship must be a symbiotic one, based on fundamental mutual interests and the mutual benefits to be derived when the two communities act in partnership in pursuit of related goals. Consequently, the NPC will take the lead in seeking to establish such a mutually beneficial relationship with the entire publishing community, including micropublishers.

Publishers are important components of the system of scholarly communication and information transfer. The basic principle of copyright legislation is to stimulate creativity by assuring that continuing rewards will be available to the holder of the copyright (most often the publisher) on published material. The NPC will respect these rights and will work toward mutually agreeable arrangements that will guarantee appropriate rewards for the copyright owners of material handled by the NPC. The NPC will not operate in a way that would jeopardize the legitimate rights of publishers to the economic benefits of their publication effort. By the same token, it will place primary emphasis on meeting the needs of library users. Recent evidence in reports by Fry and White (26) and by Woodworth (100) suggest that photocopying for ILL purposes has such a slight effect on subscriptions that the phenomenon can for all practical purposes be discounted.

The publishing environment is one of nearly infinite variety. In size alone the range is impressive -- from the largest publisher of several dozens of periodical titles to the many hundreds of publishers that publish only one. For the most part publishers that produce a large number of periodical titles are doing so in order to earn a profit. Many more publishers, however, produce periodicals for the express purpose of bringing new research and other work into the public forum. These publishers are as concerned with costs as the large for-profit publishers, but their concern is directed toward covering production costs rather than generating profits.

The recent copyright legislation has provided the legal opportunity for copyright owners to enjoy economic rewards for certain duplications of their copyrighted material during the life of the copyright. Some publishers are eager to take advantage of this opportunity to increase product income and have established prices for the privilege of duplicating copyrighted articles beyond levels permissable within the traditions of fair use. These fees, ranging from $.50 to more than $7.50 per article, are only now being exposed to the effects of the marketplace. It is too early to determine whether or not the higher fees will survive.

Under the auspices of the National Commission on New Technological Uses of Copyrighted Works, the publishing and library communities have agreed on operating guidelines that allow libraries limited, royalty-free copying for a five-year test period (1978-1982). This agreement was concluded in order to allow limited duplication of copyrighted material for scholarly and educational purposes. The guidelines specifically exclude any organizations that might be established for purposes of "systematic" copying of copyrighted materials. The term "systematic" has yet to be defined satisfactorily in the minds of both publishers and librarians, nor has it been determined whether a national periodicals center would be a "systematic" copying operation.

It is clear that the NPC will provide access to a large number of periodical titles -- both current and retrospective, domestic and foreign. The evidence available from the British Library Lending Division is that, in general, subscriptions are not adversely affected

by such a national lending library, especially the heavily used titles. Commercial publishers have, by and large, already established titles in subject fields that are sufficiently popular to warrant the expenditure of risk capital. No objective evidence exists to suggest that the NPC or any similar organization would adversely affect these commercial periodical publishers. On the contrary, even in the face of an increasing number of cooperative access networks, libraries have tried to maintain their present periodical subscription lists at the expense of funds otherwise intended for book purchase.

A number of market forces are at work that affect the publishing of periodicals far more significantly than would the creation of an NPC. In fact, some of the publisher concern with the possibility of an NPC probably stems from these other factors.

It is apparent, for example, that users of periodicals are primarily interested in access to specific articles contained in a given periodical. This is particularly true for periodicals that the user does not have in his personal collection. From the user's point of view the packaging of articles into issues is a publishing convenience, not primarily a user imperative. This realization comes or will come to publishers as their production and editorial costs climb even higher and they begin to seek cost-effective alternatives. Clearly, for-profit publishers will not embark upon publication schemes that hold no promise of a reasonable continuing profit.

A compounding element in this scenario is the increasing number of publishable manuscripts. The current response to a flood of good manuscripts is to create a new periodical or split an established title into two or more parts. This response fails to deal with the fundamental issues of high cost of publication and user orientation to the article as opposed to the periodical issue. Recommendations on alternative publication schemes and some experimentation are beginning to surface among those most concerned. Some suggest that papers having broad appeal should be published in full, while those with more narrow appeal should appear in extended abstract form with the full text of the abstracted papers available on request. Publishers may soon explore this alternative and seek income from the sale of the full paper.

Others may forego the publication of papers of broad appeal and substitute the extended abstract if individual article sales are sufficiently rewarding. It is probable that a number of other imaginative alternatives will be explored as costs continue to rise and publishers find that they are losing library subscriptions precisely because of insupportably high subscription prices.

As publication alternatives begin to develop the NPC should be in a position to facilitate the distribution function of these innovative publishers. If a publisher converts a periodical to an extended abstract title with the intent of selling the full-text version, the publisher will be faced with some inordinately high request fulfillment costs. These would have to be passed on to requesters as higher per page or per article sales fees. But an agency such as an NPC, ready and willing to act as a sales agent on behalf of publishers generally, could have several positive impacts. First, lower distribution costs could be achieved because of centralized order fulfillment and billing, which would result in lower per unit charges for the product. Second, the publisher would receive income from every sale of copyrighted material. Third, the users of the NPC (libraries and their patrons) could be assured of prompt, efficient access to all materials handled in this manner. Such a relationship between the publishers, the NPC, and the library community should promote the rapid communication of scholarly information as well as establish a working partnership in the process of bringing new research into the public forum. During the initial stage of the NPC operation, however, few if any such relationships can be expected to exist. They will come into being over time through diligent effort and effective leadership.

As noted above, there is a broad range of economic interest represented by current publishers. It is anticipated that some will come to see the NPC as a source of income, which will develop in several ways. First, the NPC would propose to establish a retail sales relationship with as many publishers as possible. This relationship would cover current as well as older materials so that, regardless of the CONTU guideline status, publishers would be assured of some income for every use of their copyrighted material through the NPC.

For those publishers that initially choose not to use the NPC as a retail sales agent, the NPC would propose to function as a library organized for the purpose of filling requests from other libraries for periodical material. Given this circumstance, the NPC would remit as required payments for the privilege of duplicating those materials that are covered by copyright.

Some publishers have contracts with micropublishers that might initially prevent them from negotiating with the NPC. In these instances the NPC would deal only with the appropriate micropublisher. Here again the NPC would seek to establish a sales agent relationship with the micropublisher. Such an arrangement would provide the micropublisher with the required income, which in turn would be sufficient to pay any obligations the micropublisher may have toward the original publisher. Failing the establishment of a sales agent relationship, some other mutually beneficial arrangement would be negotiated.

There will be circumstances in which individual articles will be copyrighted by the author(s). The standard practice is for the publisher to assure the author of any income that stems from the subsequent duplication of the article from the published source periodical. Whether the NPC is operating as a library or as a sales agent, it will, when required, remit appropriate sums to the publisher or publisher's (author's) agent, depending upon the publisher or agent to satisfy any claim that the copyright-holding author might have.

The intent of these relationships is to assure continued public access to the products of the world's information systems by (1) establishing a national periodicals resource base for libraries; (2) providing a service to assure availability and thus a continuing source of income to both publishers and micropublishers; and (3) promoting an expanded market for the products of publishers and micropublishers.

Operating Relationships: NPC and Publishers

The NPC will have to deal with a number of publisher positions on the access issue. These will vary, ranging from publishers that are not eager to become involved in the collection of fees for the use of material on which they own the copyrights to those that adopt very proprietary attitudes toward their properties. The former group is most concerned with increasing the availability of their published product and will embrace any mechanism that assures wide or easy access. The more proprietary publishers are essentially engaged in profit-making enterprises; though they are eager to see their products used, they are just as eager to assure that the use of that product generates income. Since copyright royalty fees are so new it is not yet possible to assess their impact on access to scholarly information. But it will be interesting to see if there is a decrease in subscription costs of titles that manage to generate a significant royalty income.

Early on, the NPC will attempt to identify those publishing houses that are uninterested in the modest income that might be generated by copyright royalty payments. The published products of these houses will then be made available to NPC customers for the standard NPC processing fee.

These publications will be acquired in a variety of ways. If the publisher is harrassed by the problem of back file maintenance, the NPC could offer to assume that responsibility in exchange for a cost-free subscription to the publisher's products. The back files would probably be maintained only in microfiche. If no such quid pro quo arrangement can be concluded, the publisher's products will be acquired as usual by subscription.

In the case of publishers that are concerned about secondary income, the NPC will attempt to establish working relationships with those that do not have exclusionary contracts with micropublishers. The working relationships may assume any of a number of forms. The preferred form, however, would be for the NPC to become a retail sales

agent for the publisher. The NPC could then respond to each request for the publisher's material as though the transaction were a sale. The requesting library would get the material without a CONTU guideline "penalty" for the title requested. The NPC would complete the transaction and receive its routine processing fee, and the publisher would be assured of an appropriate price for the material sold, knowing that for this use of its copyrighted material it was being rewarded. Such a relationship would of course be limited to the period during which the material is covered by copyright.

A publisher deciding to work with the NPC in a sales agent relationship might choose to provide the NPC with a cost-free current subscription and a back file of the title. Under these conditions the NPC would suggest the following fiscal relationships. The NPC would respond to all requests for materials published in the last six months by providing the entire issue in microfiche for half the cost of the NPC processing fee plus the full hard-copy single-issue price. The publisher would receive a part of the full hard-copy single-issue price as its portion of the transaction. (See "Proposed NPC Pricing Schedule," page 26.)

Some publishers deciding to work with the NPC may be unwilling to provide a free subscription or back files. These circumstances would change the relationship described in the preceding paragraph as follows. Requests received for material published in the most recent six-month period would be filled and billed at half the NPC processing fee plus the full hard-copy single-issue cost. However, because the materials have not been provided cost free to the NPC, the publisher will receive a smaller portion of the full hard-copy single-issue cost. This reduction in return to the publisher will help the NPC pay the subscription cost of the item in question.

The two preceding paragraphs have discussed an operating policy that is designed to discourage library use of the NPC in lieu of subscriptions and to recompense publishers for those transactions that might otherwise have been viewed as a loss of sales. From quite a different perspective, it should also encourage the purposeful development of local resources. Such a circumstance, if it can take

place in the present fiscal environment, should produce additional revenues for the publishing community by virtue of an increased number of subscriptions at the local level.

It is expected that the requests flowing to the NPC will be for specific articles. When filling these requests from material published in the most recent six months, only copies of full issues will be provided at the cost outlined above. There are several commercial sources for articles of such recent vintage, and requesters should be aware of their existence. It is also possible that certain publishers will authorize the NPC under special circumstances to provide access to these recent articles.

Requests for individual articles from periodicals seven or more months old will be filled either with a photocopy of the article requested or by duplication of a microfiche upon which the article appears. Whether or not that microfiche includes an entire issue is not relevant. (It will of course not include the whole of an issue containing more than 96 pages, since 96 is the normal number of text frames on a single microfiche.)

The following paragraphs describe the suggested fiscal relationship between the NPC and the publisher with regard to older materials regardless of whether subscriptions are provided free of charge. Requests received for articles published in the most recent seven to sixty months would be filled and billed at the NPC processing fee plus a sales fee possibly based on some portion of the current hard-copy single-issue price, approximately $2.00. The publisher would receive the full sales fee.

Requests received for material more than five years old but still covered by copyright would be filled and billed at the NPC processing fee plus one-half the seven- to sixty-month sales fee, approximately $1.00. Once again the entire sales fee would be forwarded to the publisher.

The transactions so far described should be viewed as sales of publisher product. Since they are sales, the transactions need not be considered as subject to the copyright guidelines established by CONTU

for requesting libraries. While this is likely to be a relief for those libraries using the NPC, it may be so great a relief as to generate more demand than might ordinarily be expected. Such a shift in demand to the NPC would be viewed positively from the publisher's point of view since it would result in increased publisher revenue.

Those publishers who are not interested in working with the NPC will present an operating problem, but not an insuperable one. The NPC may have to resort to referral library sources to fill requests for the products of such publishers. This will probably reduce publisher income from document delivery activity, since these transactions will be identified as eligible for CONTU guideline restrictions. Thus requesting libraries will be able to make at least five requests in any one year for material from a given title published within the last sixty months before being required to make royalty payments.

Operating Relationships: NPC and Micropublishers

As often as possible the NPC will attempt to acquire material in microfiche. The NPC will need to establish effective working relationships with the microfilm publishing community. The existence of a national periodicals center should not threaten the economic interests of micropublishers -- it should instead actually contribute to micropublisher revenues. As with publishers, one way of assuring this is for the NPC to function as a sales agent for micropublishers.

As a sales agent for micropublishers the NPC will deal in the sale of small portions of published works. These "nuisance" sales are for less than a complete volume -- a single article, for instance, or even single issues. In any case, unless specifically authorized by a micropublisher the NPC will avoid sales involving complete volumes or runs. The NPC will concentrate on its primary mission in the nation's emerging information system: to assist in the acquisition of specific pieces of information (usually single articles) for the inquiring library user.

The NPC will require access to materials for which certain micropublishers have exclusive rights granted by contracts with the original publisher. The NPC will honor these arrangements and will be prepared to pay for access to these materials. However, these payments should be based upon actual, and not anticipated, use. Especially during the early years of operation, data on anticipated use may not be reflective of actual future demand. Therefore, to protect the economic interests of the micropublishers as well as those of the NPC, payments must be based upon actual use and upon the fact that the NPC may enhance the use of these materials.

Some micropublishers, viewing the NPC as one of its sales agents, may wish to give material to the NPC - or deposit it - in expectation of sales. Materials not covered by micropublisher-publisher contracts might also be given to the NPC in anticipation of sales. In all cases, when the micropublisher owns the copyright or has exclusive microrights to material, NPC transactions involving this material will result, when required, in payments in consideration of these rights.

Since all transactions involving the products of micropublishers will involve duplication, this activity will have to be authorized and considered a sale. For the most part such transactions will involve no more than one fiche. Charges should be developed on a per-fiche use basis.

Because each sale/transaction will carry the NPC processing fee plus a sales charge, it will not be rational for libraries to attempt to build fiche collections by purchasing them from the NPC -- the micropublisher can sell the entire back file of a title for much less than the cost of acquiring it through the NPC. Thus the NPC cannot be viewed as a threat to the micropublishers' markets; if anything it is likely to enhance sales activity.

There may be those micropublishers who for one reason or another choose not to sell to or negotiate with the NPC. In some of these cases the NPC will attempt to deal with the original publisher. In those cases where the NPC or the original publisher is proscribed from negotiating because of exclusionary contract provisions, the NPC will

have to explore other mechanisms to assure (1) access to the information requested and (2) that the information will be preserved.

One such mechanism would be for the NPC to provide access through the referral system to those titles for which a mutually satisfactory access arrangement cannot be negotiated between the NPC and the publisher or micropublisher. If heavily used titles are involved, it would be reasonable to have several libraries, regionally distributed, serve as referral sources for a given title and to reward libraries providing the service through some special arrangement. This would spread both the request load and the responsibility for filling the requests, although it would obviously be more efficient for the NPC to handle the backup function for the heavily used titles as often as possible.

It should be noted here that those requests that are transferred into the referral system become library-to-library requests with the NPC acting only as a message-switching center. In this case the CONTU guidelines come into effect, and the requesting library during any one year does not have to pay a copyright royalty for at least the first five requests for material from a given title published in the last five years. But if access can be provided from the NPC collection, the CONTU guidelines will not apply. The transaction will be considered a sale, and copyright holders will receive a payment for every transaction during the period in which the title is covered by copyright (except for those copyright holders that do not require such payments).

This chapter has suggested ways for the NPC to develop its collection at a reduced capital cost. It is recognized, however, that these strategies require time to negotiate and implement. The following chapter on collection development does not therefore assume the presence of these agreements. In any case, most titles acquired during the first year will have to be purchased in order to allow sufficient time for the NPC to develop the contractual relationships described above.

COLLECTION DEVELOPMENT

This chapter of the technical development plan deals with the collection development aspects of the NPC. It does not list the actual periodicals to be purchased but attempts to establish the framework and strategy for such individual decisions. The collection development processes are divided into prospective and retrospective elements. The methodology of acquisition is discussed and recommendations are made that incorporate the new types of relationships with the publishing community discussed in the previous chapter. Additional discussion of selection and ordering procedures is presented in the chapter on technical processing.

Periodical Universe

The Nature of the NPC Collection

A periodical is defined as a publication issued at stated intervals, normally of a year or less in length. By this definition a periodical can be either a monthly magazine containing a number of separate articles or an annual directory of a membership organization. The NPC will not attempt to collect all materials that fit the broad definition of periodical but will restrict its efforts to those publications that contain multiple articles. Annuals (e.g., Annual Review of Information Science and Technology) or irregularly published serials that contain multiple articles will be included. Directories, indexes, and other serials that are data or reference oriented rather than article oriented will be excluded. Serials that are monographic in orientation (one article per issue) will be selectively included. The primary criterion for including a periodical in the NPC collection will be whether it normally contains individual articles.

Additional categories of material have been excluded from the NPC collection because other agencies already have the responsibility for providing access to the material. The following list summarizes the inclusion-exclusion judgments recommended for a number of special types of periodicals.

Abstracts/summaries.....excluded
Book review digests.....excluded
Catalogs.....excluded
Clinical medicine.....initially excluded
Conference publications.....included
Directories.....excluded
Government documents.....selectively included
Indexes.....excluded
Law reports and digests.....excluded
Legal cases and case notes.....included
Legal periodicals.....included
Legislation.....excluded
Statistics.....selectively included
University calendars.....excluded
Yearbooks.....selectively included

Defining the Universe of Periodicals

There does not now exist a reliable estimate of the size of the universe of current periodicals. There is no comprehensive file or set of files on which to base such an estimate. It is a counting problem, one that is compounded by the fact that cataloging rules affecting serials have changed significantly in the past forty years. Further, application of these rules among libraries has never been consistent. The best estimate available is that the universe of titles is between 100,000-200,000. Our interest in determining the magnitude is two-fold:

1. To determine the size of the eventual collection needed within the NPC and its referral system in order to provide comprehensive coverage.

2. To determine the distribution of requests over the ranked population of titles so that the NPC can provide maximum benefit to the library community in the initial years of operation.

In this plan the figure of 120,000 current periodicals is used. This is based on:

1. An analysis of the LC serials files (the most comprehensive known).

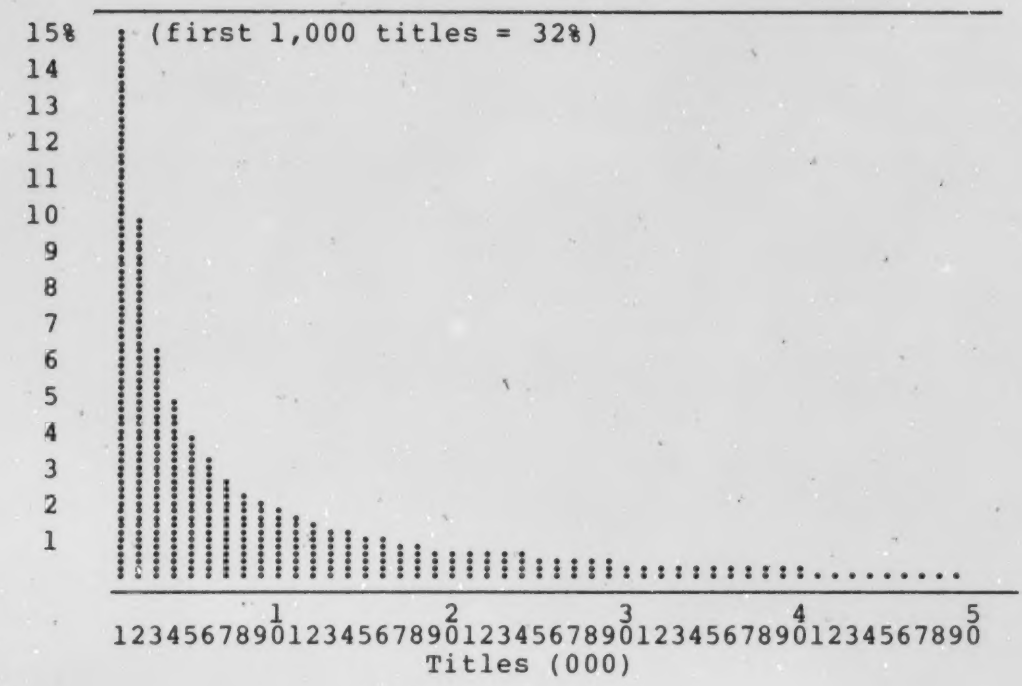
2. The distribution model below, which shows that the distribution of requests would not vary significantly when the title population exceeds 100,000.

If this estimate is low, little damage will be done during the initial five years in terms of collection development strategies. It is expected that further refinements to the estimate will be possible with NPC operational experience and the continued development of the ISDS and CONSER files. The British Library Lending Division's experience suggests that in a ranking by demand, most titles beyond the first 80,000-100,000 are rarely to never sought.

Request Distribution

The distribution of requests over an estimated ranked title population can be approximated by using a logarithmic (log) normal distribution model. Using the request distribution estimate in 2 above, it is possible further to estimate the potential use of a given set of titles collected by the NPC and/or the referral system and to gauge the NPC's impact on existing interlibrary resource-sharing patterns.

Log Normal Distribution



This is the log normal distribution curve used to estimate the NPC's capacity to fill requests. It is derived from the work by Williams (97) and is based on a population of 120,000 titles. The vertical axis represents the percentage of total demand satisfied by a group of 1,000 ranked titles (the horizontal axis).

This model is based on a number of additional assumptions outlined below.

1. "Ranked title population" in this distribution model means that the population of individual periodicals is arranged by the number of requests (or potential requests) with 1 being the most heavily requested title, 2 the next most heavily requested, and so forth. The log normal distribution function is a mathematical relationship similar in some ways to the normal distribution function (the bell curve) but skewed heavily to the left. While it has other operations research applications, its use in this application was suggested by Williams.(97) It is sensitive to the estimate of the total number of titles, but less so after that population exceeds 100,000. Palmour used this and other data to produce his estimates of the distribution of requests in the NCLIS report.(55)

   Using this model it is possible to estimate the percentage of total requests that can be satisfied by any segment of the ranked title population. The table on page 50 summarizes the estimated distribution of requests but does not take into account the lack of back files in the collection.

2. The distribution of requests for a given title over its life span can be estimated with a decay function of 7 percent. That is, if in 1981 100 requests were to be received for the 1974 volume of a title, it is estimated that 93 requests will be received for that same 1974 volume in 1982. It also suggests that in 1981 93 requests will have been received for the 1973 volume. This function will vary from subject to subject and from title to title but should represent a workable estimate for the entire population. (This technique has been used by the National Technical Information Service to predict future demand.) Combined with the log normal distribution, the decay function allows the estimation of potential fill capacity, which is useful in predicting traffic flow to the NPC, and the distribution of that fill capacity over the collection within the NPC and the referral system. The foregoing assumes, of course, a reasonable validity for the log normal distribution and the 7 percent decay rate.

3. It must be realized that the above distribution functions are based on a ranked title population and that the NPC will not have accurate ranking data initially. Initial collection development decisions will have to be made on the basis of other factors that

suggest potential use, such as coverage by abstracting and indexing services and the operational experience of existing ILL centers (e.g., BLLD, MINITEX, and NYSILL). After one year of filling requests, however, the NPC will have enough data to establish a more accurate ranked order of titles specific to the NPC operation.

The following table represents the cumulative aspects of the curve.

Cumulative Log Normal Distribution Curve

Titles	% Of Total Requests
1,000	32
2,000	42
3 000	49
4,000	54
5,000	58
10,000	71
20,000	83
30,000	89
36,000	92

General Collection Development Parameters

In formulating a general collection development strategy it is necessary to keep in mind that the NPC hopes to improve the reliability -- and hence the predictability -- of ILL system performance. Further, the NPC will retain and preserve its collections in perpetuity insofar as possible and will eventually be able to fill 90 percent of the valid

requests it receives. To these general objectives must be added several other operational assumptions:

1. All subject areas will be served with the initial exception of clinical medicine.

2. The NPC will produce a finding tool that will list the titles and volumes held by the NPC and the referral system. Requests to the NPC will be limited to cited titles.

3. The NPC will endeavor to develop the capacity to satisfy 50 percent of all ILL requests generated in the nation by the fifth year of request processing.

Fulfillment Capacity and Cost

Fulfillment capacity refers to the ability of the NPC to satisfy, based on its collection, a portion of all periodical requests generated in the United States, if all requests were directed to the NPC. It is not anticipated that all requests will be sent to the NPC. Even so, it is a useful concept since the NPC will be used as a backup for local resources and therefore must collect those titles heavily used in local libraries. To collect prospectively means to obtain new material by subscription or other arrangement as it is published. Retrospective collecting, on the other hand, refers to the acquisition of back files. To assure that the NPC will eventually have the capacity to fill a high percentage of all ILL requests, it must receive on a current basis a broad spectrum of titles. To be most useful to libraries, it must be able to fill at least 50 percent of all ILL requests by the fifth year of operation.

It is proposed that the NPC prospectively collect at least 36,000 titles. Even though after 25 to 30 years the NPC would be able to fill over 90 percent of ILL requests, after five years of such prospective

collecting it would have less than a 30 percent fulfillment capacity. To increase its capacity to the desired 50 percent, the NPC must collect retrospectively as well. Obviously the back files of titles most heavily in demand should be collected first to raise the fulfillment capacity as quickly as possible.

Raising the fulfillment capacity quickly in the early years is important to the acceptance of the NPC by the library community. Acceptance will depend not only on the NPC's performance in delivering what it promises within acceptable cost and time parameters but on its overall usefulness as well. That is, how often can a library expect to use the NPC to fill its requests as opposed to other resources? If the NPC collects exclusively in a prospective manner, its fill-rate capacity will be limited to only 7 percent after one year. This is unlikely to stimulate a demand for its services among libraries, which could not use the NPC as often as they might desire. Thus retrospective collecting in the NPC's early years for heavily used items is necessary to increase its overall usefulness to libraries and their users.

For the purpose of producing cost estimates, this plan assumes that the NPC will obtain most periodicals through purchase of subscriptions and back files. While back files of many of the heavily used titles may be available as donations from libraries, especially from those that maintain multiple subscriptions, the NPC cannot count on this initially, nor can it rely on donations from publishers as discussed earlier.

It is estimated that the NPC must collect at least 65,000 volumes of back files in the most heavily used 2,000 titles. If for some reason back files for these titles are not available, the NPC will have to concentrate on the next 3,000-10,000 titles. This latter group of back files will have less impact on the NPC's capacity to fill requests. Further, collecting these back files will increase costs since they are less heavily used and thus more likely to be available only in a more expensive hard-copy form. It is estimated that only half of the 10,000 most heavily used titles are available in microform, and these are concentrated in the most heavily used 5,000 titles.

Cost estimates suggest that in 1980:

1. Current subscriptions will average $43.00 per year (based on figures from periodical suppliers).

2. Back files in microform will average less than $25.00 per volume or year (based on analysis of microfilm publishers' catalogs).

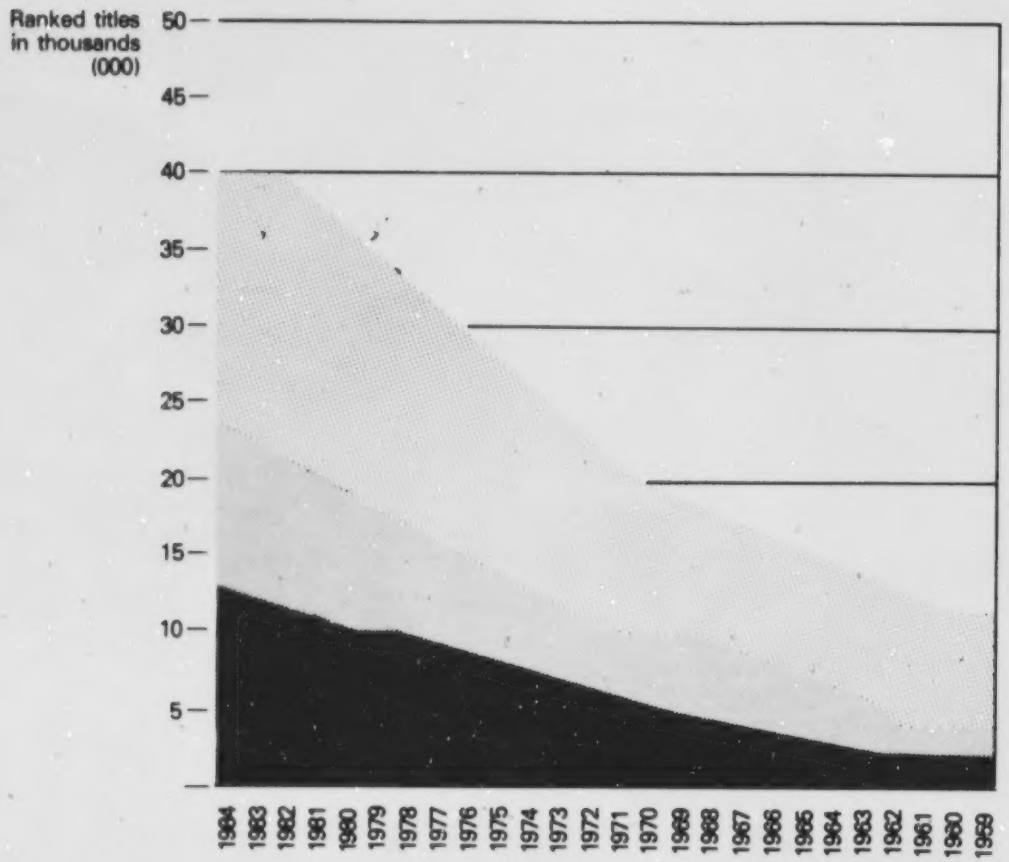
3. Hard-copy back files will average about $40.00 per volume/year (based on analysis of out-of-print periodical dealer catalogs).

To project the costs of the back files, therefore, it is assumed that 80 percent of the heavily used titles will be available on the open market and that 80 percent of these are in microform. The average cost per volume or year of the back files (80 percent in microform, 20 percent in hard copy) will be $28.00. The total cost for 65,000 volumes or years of back files over five years will then be $1,820,000 — or less than $375,000 per year. If the back files are all within the first 2,000 titles, the NPC's overall fill capacity will be increased to more than 25 percent.

The cost of current subscriptions for 36,000 titles will be $1,548,000 per year, discounting annual inflation. The NPC will add new subscriptions at a rate of about 4,000 new titles each year. But some titles will cease to be published and by the second and third year the publisher-NPC agreements should begin to make available more nonsubscription material. It is therefore estimated that the NPC will require an average of $1,720,000 per year for the first five years for prospective collecting. When this figure is added to the $375,000 required per year for the purchase of back files, the estimated cost per year for acquisitions becomes $2,095,000.

With the above suggested acquisition rates a 90 percent request fill rate can be achieved if the NPC restricts requests to holdings that are published in a finding tool.

Demand Intensity Model



This graph illustrates the importance of collecting back files for at least the most heavily demanded titles. Each cell or space on the graph represents one year's file of 1,000 titles, the titles being ranked according to demand. Moving from the bottom to the top, the cell represented by the narrow black area would be responsible for over 0.5 percent of the total demand, the dark grey area for over 0.1 percent, the medium grey area for over 0.05 percent, and the light grey area for over 0.02 percent. The model represents the collection in the year 1985 after five years of collecting. It is obvious from the point of view of capacity that it is more productive to collect extensively in the heavily demanded back runs than to concentrate solely on prospective collecting.

Prospective Collection Development

The general collection development strategy proposed above suggests that to arrive at a 50 percent fill capacity after five years of collecting, about 20 percent of the funds available should be spent on back files and the balance on current subscriptions. This represents an average acquisitions budget of $2,095,000 per year.

After the heavily used back files have been acquired, the emphasis in acquisitions must shift to lesser used but currently published materials. The goal of the NPC after all is to improve access to required periodical literature in as comprehensive a manner as possible. To do this, the NPC should expand the number of current subscriptions it receives as rapidly as the demand for additional titles warrants. Any other acquisition funds that become available should also be put to this purpose.

Selection

Since the NPC will have limited funds for collection development and since 20 percent of these funds must be used for back-file acquisitions, the NPC will not be able to subscribe to all required periodicals at the outset. It must make some difficult acquisition decisions. Further, the NPC will not have a long lead time (at most six months to a year) in which to select periodicals and prepare orders. Taking these factors into account, the following methodology for the initial selection of titles is proposed:

1. The collection development staff should begin work nearly one full year prior to the receipt of the first purchased issues.

2. Using demand data from the British Library Lending Division, the staff will establish rough title-ranking estimates. This should be supplemented by data from NYSILL and MINITEX.

3. The staff will establish a data base using the International Serials Data System (ISDS) base file (60,000+ records) plus quarterly updates and the current titles from the CONSER files. Temporary records for titles not yet covered by ISDS will be incorporated into the ISDS base file. (See the chapters "Bibliographic Control" and "Technical Processing" for a discussion of the use of the ISDS.)

4. The NPC will use existing periodical subscription services or agencies to obtain source data, with the promise that a certain number of orders will be placed through those vendors. Even when orders are placed through an agency the source data is needed for claiming.

5. The staff will append to each record in the base file the initial ranking data and, where needed, source data (where to order).

6. Initial orders will be placed several months before the beginning of the first calendar year of collecting.

The data base described here will be used for a variety of purposes described elsewhere in this plan. For purposes of collection development it will be used as an ongoing selection tool, not only for the NPC collection but for the referral system as well. After the initial selection the base file will be kept current, with the addition of such data as that described above, and enhanced with other information, such as coverage of titles by abstracting and indexing services. The latter should aid in selection decisions, since titles covered by these services will have a higher request probability than those not covered. It may also be desirable after the initial selection to add data from the machine-readable files used by the R. R. Bowker Co. to produce Ulrich's International Periodicals Dictectory and the New Serial Titles 1950-1970 cumulation, both of which include International Standard Serial Numbers.

The NPC must purchase first those titles for which the demand is expected to be highest so that it can quickly establish itself as an ongoing operational entity. Once the initial selection is made, the NPC

can concentrate on the other primary objectives, those of reliable access to required material and preservation. These objectives will, in part, be addressed through the establishment of a referral system and also through the expansion of the NPC's prospective collecting to include less frequently requested material. To the initial 36,000 titles the NPC should add:

1. Newly published titles.

2. All titles cited in U.S. and major foreign abstracting and indexing services.

3. Titles suggested by libraries as unavailable via standard ILL sources.

Acquisition

Ideally, the selection work should precede actual procurement by approximately a year; that is, if the NPC were to open its doors to requests in 1981, it should start collecting material in 1980, which means selecting that material in 1979. The reason for this is obvious. It would be very difficult to organize in one year the required personnel and machinery to initiate 36,000 orders and to accept receipts and still expect to accumulate a solid one-year back file for that year. Selection of a basic collection must precede actual ordering and can be done with limited data processing capability and a small staff.

The actual methods of acquisition can and should vary. The NPC should make every attempt to acquire new subscriptions at no direct dollar cost. There are a number of ways to approach this objective.

1. Gift/Exchange. Some noncommercial publishers, particularly those connected with professional societies, might be willing to donate subscriptions to the NPC. Others might be encouraged to do so in exchange for a copy of the major NPC publication -- the finding tool.

2. Sales Arrangements. If the NPC can assure that for every use of a copyrighted item a publisher would receive a payment, many publishers may come to consider the NPC as a sales agent and, as such, an income site. Such a publisher might well provide material to the NPC at no cost.

3. Back File Agency. The NPC could act as a back file agent for those publishers that have no interest or capacity to function in this area. Many academic presses as well as society and other nonprofit publishers might fall into this category. Again, a sales relationship might be part of such an arrangement. The materials given to the NPC would be given in expectation of sales.

4. Library of Congress Current Periodical Receipts. The file used by the Library of Congress to check in periodicals contains entries for over 110,000 "current" titles. Much of this material is not checked in at all but immediately routed to another LC department or discarded. These discards currently are made available to the Universal Serials and Book Exchange and other agencies. It is possible that some arrangement could be developed so that the NPC would have access to selected portions of this material.

5. Copyright Registration. If LC becomes the manager of the NPC, serious consideration should be given to combining the collecting of NPC material with copyright registration. Only about 15,000 serial titles are currently being registered for copyright in the United States. The registration activities of publishers are sometimes erratic; for example, they will hold issues and send a batch to be registered all at the same time, or they may forget to send them at all.

   If LC could modify its procedures for copyright registration with regard to periodicals so that material donated to the NPC was automatically registered, the NPC would have a cost-free source of material. This might, of course, require a change in the law. At the moment publishers have no hope of income from such a deposit at LC, but a sales relationship with the NPC could alter that.

6. United States Postal Service (USPS). The NPC may be able to work with the U.S. Postal Service in a cooperative manner. The proposed use of the ISSN for control of second-class mailing privileges is a start. The Postal Service now examines at the local post office at least one copy of each issue to be mailed from that office. It

might be possible to modify the regulations to require that a copy be sent to the NPC to verify that the data is consistent with previous issues and the permit. The regulations regarding title changes and the like are remarkably similar to the ISDS regulations on which the proposed bibliographic control system would be based.

It is clear that the NPC should attempt to reduce as much as possible the direct cost of acquiring material. There are, however, several trade-offs to be considered. First, gift materials have a less reliable receipt pattern than purchased materials. Therefore the cost of processing and claiming these materials will be higher. Second, the concept of the NPC as an agent of the publisher either for back files or for current material will require the presence of another type of staff -- liaison personnel to promote the idea among the publishers and to monitor such arrangements. In essence, free material is not quite free.

Some of these possibilities for acquisition point to a much closer interface with the publishing community than has been perceived by some. These relationships were explored in depth in the previous chapter where publishers were described as a critical element in the implementation of this plan. The NPC and libraries must be willing to cooperate if they expect cooperation from publishers. The NPC outlined here will be in a position to do so. The very existence of the NPC will be difficult for some publishers to accept, regardless of policies established to assure benefits for authors and/or publishers. The NPC cannot hope to satisfy everyone, but it should be able to encourage the cooperation of a significant segment of the publishing community by attitude, service, and policy.

Retrospective Collection Development

As mentioned earlier, during the NPC's first five years there will be a significant attempt to acquire back files for the most heavily requested material. If the collection development budget for these five years averages $2,095,000 per year, as much as $375,000 of it should be allocated for the purchase of back files. Once the NPC is able to fill half of the potential traffic it might receive, the emphasis can be shifted from back files to current subscriptions and the NPC can then concentrate on expanding its depth of coverage in terms of numbers of titles.

Selection

The emphasis of the retrospective collection development activities must be on the most heavily used titles in order to increase the capacity of the NPC to fill requests. Cost is also a factor. To acquire back files other than those having a relatively heavy demand is expensive since the majority of those titles would probably not be available in the less costly microformats.

Acquisition

There are a number of ways in which back files can be acquired. Among them are:

1. Donations/Deposits. While the NPC will purchase the most heavily used titles, it is possible that some of them will be available from libraries holding multiple copies. Early acceptance of the NPC as a reliable institution may increase the amount of material received from this source. If libraries know that they have a reliable source for specific periodicals at a reasonable cost and with a rapid response time, they may be less apprehensive about

weeding their collections in order to make room for material with a higher probability of local use. The donation or deposit of back files will contribute to the comprehensive nature of the NPC's collection and thus the capacity of the NPC to respond to ILL requests.

In the early years before the NPC has assumed a more permanent stature, it will be necessary to create a deposit mechanism that will encourage libraries to donate periodical material to the NPC. This deposit mechanism would assure that, should the NPC fail for whatever reason, the donated titles would be returned to the original donor. The NPC would have the option of converting the material to any other format for its own purposes and would not be under obligation to preserve the original format. It would also have to be agreed that the NPC would be held blameless from any loss resulting from circumstances beyond the control of prudent management practices. Such arrangements might be expected to lead to the donation of substantial amounts of material from libraries all over the country.

It is possible that entire collections may be donated to the NPC. A case in point is the periodical collection of the Center for Research Libraries. In other cases where a university eliminates a department or an entire school closes, collections supporting that activity might also become available. There are other potential sources of collections. Abstracting and indexing services such as Chemical Abstracts have back files of serials that could be added to the NPC. The size and impact of these collections would have to be evaluated.

2. Publisher Agent. As mentioned earlier, the NPC will ask cooperating publishers to furnish a single copy of their back files, which the NPC will microfilm, giving one copy of the film to the publishers. The NPC will then provide copies of individual issues to libraries on demand, charging a sales fee, a portion of which would be paid to the publisher. Since many publishers (particularly academic presses) are not normally responsive to back file requests, this might be a useful service for them and a potential source of additional income. The cost of the back files to the NPC would basically be the cost of filming the issues.

3. Universal Serials and Book Exchange (USBE). The existence of the NPC will have an impact on the serials operation of the USBE. USBE obtains a significant portion of its issues from the LC discard

file. The NPC may absorb a portion of these titles directly from LC. But USBE has other sources and may be extremely useful for filling gaps and for providing limited back files, particularly in the early stages of the development of the NPC collection. Referral libraries may also find USBE useful for completing back files for which they accept referral responsibility.

Funding Considerations

If, in the long term, the major portion of the procurement funds must be used for current subscriptions, funds for retrospective collecting can be generated in several ways.

1. Premium. The premium levied on the titles in heavy demand could be used to pay for the acquisition of back files. The less heavily used titles will make no contribution since there will be no premium charged on them.

2. Special Funding. It is reasonable to expect special funds to be made available for back-file acquisition from a number of sources. Smaller special purpose funding agencies and professional societies could be approached to fund the acquisition of back files of serials in their areas of interest. Institutions and individuals could also be approached to support the acquisition of specific costly back files of special concern. Major foundations concerned with the capital costs of back file acquisition might also provide sufficient support to purchase the back files required in the first year or two of operation.

REFERRAL SYSTEM

The primary purpose of the referral system is to back up the NPC by providing access to specific periodicals that are seldom used but which are intentionally retained by one library or another because they are pertinent to specific subject fields in which an exhaustive collection is sought and supported. Low use by itself is not a constraint on NPC acquisition, but it is impossible for the NPC to acquire all current titles at any given time. The referral system is essentially a device to help provide access to the large number of titles for which aggregate demand is slight. The referral system proposed in the NCLIS report and the one that operates in New York State through NYSILL have a similar purpose but differ in the mode of operation. This chapter describes how the referral system would work in the context of this technical development plan.

In addition to the purpose above, it is possible that the referral system may also be used to supply, within the guidelines of the copyright law, materials that the NPC itself cannot provide. If, for example, the NPC should be unable to enter into a cooperative sales relationship with a publisher for a title in heavy demand, it might contract with a referral library to handle the title. Since it is anticipated that the NPC will enjoy effective working relationships with most publishers, only an unusual circumstance would force the NPC to use the referral system for this type of material.

Conceptual Framework

The referral system is composed of selected libraries and information centers that agree on a contract basis to provide access to specific periodicals that are not in the NPC collection. In general, these periodicals will be the less frequently requested ones. Although many of the referral libraries will be major academic and research institutions, including the three national libraries, the system will not necessarily be limited to those institutions. The referral system will have the following attributes:

1. Referral libraries will be reimbursed for filling requests directed to them by the NPC. The reimbursement may be in the form of credits for future use of the NPC or may assume some other mutually agreeable form.

2. Periodicals to be serviced by referral libraries will be integrated into the NPC's finding tool on a title-by-title basis after operating arrangements have been established between the NPC and individual referral libraries.

3. The finding tool will distinguish between an NPC-held title and one held within the referral system but will not specify the referral library providing access to the title, thus forcing all requests through the NPC.

These attributes are intended to:

1. Minimize NPC costs for handling requests that must be directed into the referral system.

2. Reduce substantially the present volume of requests sent directly to the referral system components from requesting libraries.

3. Reduce the cost per filled request at each referral library and reduce the turnaround time at these libraries.

4. Reduce for both borrowing and lending libraries the guesswork that accompanies interlibrary loan of periodical material.

5. Allow the NPC flexibility in determining whether a particular title should be handled by it or the referral system.

The concept developed earlier that only material listed in an NPC finding tool can be requested from the NPC will also hold true for requests directed to the referral system. This will reduce the time required at the NPC to forward these requests. It will take the guesswork out of the system for titles under NPC inventory control. The goal is to reduce to a minimum the interaction of NPC personnel with incoming requests since the computer, once it receives a request, should be able to determine the holding location and automatically reroute the request.

The costs for the libraries participating in the referral system will be reduced because:

1. The NPC will contract with referral libraries for known holdings of specific titles of very low probable demand. The NPC itself will collect the titles for which demand is at all significant; this should reduce the present volume of request traffic now directed to the libraries that are current net lenders. The reduction in their work load should result in a reduction of costs in their ILL operations as well as in an improvement in their turnaround time.

2. Even if the NPC title citation differs from that of a referral library, the library will be able to quickly relate the NPC citation to its own form and the specific location of the title. It is assumed that each referral library will have a small cross-reference file that will accomplish this, a process less costly than current methods of validating requests received from borrowing libraries.

Since all transactions directed to the NPC, whether referral or not, will flow through the NPC's computer system, the NPC will be able to monitor demand. If the demand for a title is unexpectedly high the NPC will be able to decide to purchase the title and relieve the request pressure on the referral library.

Local and regional ILL centers may be able to supplement NPC demand data by providing information on request traffic at that level. If they collect this data using ISSNs, the two sets of data can be merged in order to assess the character of national ILL traffic. Such analysis should be accomplished through use of sampling techniques as opposed to measuring all transactions.

This approach to the referral system reflects the overriding concern that the NPC be as efficient to operate as possible. The concept of limiting requests to an extensive but carefully controlled list of titles promotes this goal by making it possible to rely on a high degree of automation and, where justifiable, to reduce the labor intensiveness of the operation. This approach will also assure that in the early years the NPC will not be burdened with a large number of requests that it cannot satisfy at a reasonable cost within a reasonable time. By extending to the referral system the concept of the finding tool as the only mechanism for access, the NPC will limit the scope of the total resources available through its facilities during its initial years, but it will significantly increase the probability of satisfaction for those users whose requests it is able to service. Since the finding tool will include referral library holdings, the NPC will have to establish effective working relationships with referral libraries to assure accuracy of this data.

In the near term, this approach will not decrease the present level of access to that segment of the literature outside of NPC control. Libraries will be able to employ the same procedures they currently use until such time as these titles come under NPC control. What it does suggest is that after the NPC has achieved the capacity to fill a high proportion of the requests addressed to it, it will begin to accept requests for all periodicals, whether or not they are listed in the finding tool. This will happen only after a significant portion of the request traffic can be handled in a routine cost-effective manner. The determination as to when the NPC should open the doors to requests for all periodical material should be left up to the management of the NPC and should be based on actual experience.

The alternative to an NPC that provides access only to NPC-controlled titles listed in a finding tool is the creation of an NPC that operates under the constraints of the present ILL environment. The only noticeable change would be that the NPC would represent another site that might have the material the borrowing library requires. Unless the document delivery mechanism becomes more rational for the majority of libraries, little improvement in the present ILL environment can be expected. In fact, if the NPC is simply put in the position of having to receive, interpret, and redirect requests, not only time delays but significant costs are added. How are the judgments of a central staff to be significantly better than those at the requesting library? The nature of the ILL process must be changed for the great majority of the traffic before one can realistically expect an adequate national document delivery service.

Development Strategy

In addition to the files and systems needed to determine the NPC's initial collection, the NPC will also maintain a file of records of currently published titles not selected for initial inclusion in the collection. Rough demand data will have been appended to most records in order to make selection decisions. There will be two types of primary data:

1. Demand data from existing ILL centers such as BLLD, NYSILL, and MINITEX.

2. Abstracting and indexing service coverage data.

An effort will be mounted to encourage all libraries to report to the NPC any titles they have requested from another library through normal ILL procedures but that prove to be unavailable. This data will enable the NPC to refine its own collection as well as to select titles that might be handled within the referral system. Both decisions are functions of demand (or potential demand).

The data available to predict demand during the start-up period will be rough and not definitive (See Appendix A, page 177). Only operational experience can validate such predictions. Thus in an operating environment and based on actual demand the NPC may have to periodically readjust its list of titles ordered. The documentation of actual demand will not only affect the treatment of titles within the NPC in terms of format (microfiche vs. paper) but will enable the NPC to determine which titles should be shifted from the referral system to its own collection. Demand levels should stabilize for the bulk of the titles after several years' experience, except for titles new to the NPC or to the referral system.

During the first year of collecting, the NPC will attempt to negotiate with referral libraries for coverage of 10,000 titles in addition to those to be maintained at the NPC. This will be done as follows:

1. Titles will be identified in the selection files as potential referral system material based on estimated demand.

2. Locations will be found through existing tools (New Serial Titles, CONSER, union lists, library catalogs, etc.). Under normal demand conditions only one location will be required for each referral system title.

3. NPC staff will contact potential referral libraries to determine their willingness to provide access for prospective and retrospective material on a title-by-title basis.

4. A standard contract or agreement will be drawn stating performance criteria, with initial titles listed as an addendum. Only one contract per institution should be required with additional titles to be added by mutual consent.

5. The title(s) will be listed in the finding tool.

6. The library will take an inventory of retrospective holdings of the titles in question and report to the NPC. The NPC will revise the holdings statement in the finding tool (a process that can also occur as part of steps 3 and 4).

After 15,000-20,000 titles have been added to the finding tool, this approach should be evaluated. The emphasis thus far has been on titles not held by the NPC. Retrospective volumes of titles for which the NPC has current subscriptions but no back files need to be considered as well. After one year of operation the NPC will have data to suggest where it should collect back files of current holdings and what titles might be usefully covered by the referral system.

The ability to analyze the distribution of requests among the referral libraries is important. No referral library should receive more requests than it anticipated or than it feels it can handle. Similarly, the request load on a referral library must ultimately be sufficient to justify a staff large enough to provide prompt, efficient service. Consequently, total institutional load and the demand for each title must be carefully monitored. This may result in the assignment of greater or fewer titles to an institution and/or acquisition of specific titles for the NPC, thus removing them from the referral system.

The performance of referral libraries is another issue. Initially, in order to monitor performance it may be necessary for each library to report the time and date each transaction is filled. This can be accomplished by using simple codes. The reports will be prepared daily and transmitted when the library receives a new batch of requests from the NPC. As routines and performances in each referral library stabilize, only a sampling of performance may be necessary except in the case of unsatisfactory results.

Contractual Arrangements

The success of the NPC will depend on its ability to fill a high percentage of requests directed to it at a reasonable cost and within a reasonable time (24 working hours for the NPC).

The success of the referral system also depends on these factors. A high proportion, if not all, of the requests directed to a referral library can be expected to be filled since only known holdings will be listed in the finding tool. Reasonable cost and time requirements will be stated in the referral library contract. The contract will assure that borrowing libraries receive a level of service commensurate with that of the NPC and will protect both the NPC and the referral library. The essence of the contract is as follows:

1. The referral libraries will agree to respond to requests directed to them by the NPC for specified titles. Requests not routed through the NPC will not be reimbursed by the NPC.

2. The requests will be filled with a photocopy (or other mutually acceptable form) and only in special cases with the original item.

3. The referral library's NPC account will be credited at the rate of one NPC-filled nonpremium request for each request filled by the library within two working days. This credit is not refundable in cash but can be used only for NPC services. Requests not filled within that time will result in no credit. Other credit or cash arrangements may be necessary but should be left to the discretion of NPC management.

4. The NPC and the referral library will each reserve the right to delete titles from the list of those to which the referral library agrees to provide access.

5. Titles can be added to the list only by mutual consent.

6. If a referral library drops a subscription from the list of titles to which it has agreed with the NPC to provide access, it will notify the NPC.

7. If a referral library consistently provides inadequate service, the NPC reserves the right to make alternative arrangements.

Telecommunication and Data-Processing Requirements

As stated elsewhere, the finding tool will not list the actual location of referral library titles and/or volumes. When a request that will ultimately be filled in the referral system is received at the NPC, the same validity checking (user codes, user accounts, ISSN, etc.) will be done as with requests for titles and volumes held in the NPC. When the ISSN and date/volume data are checked against the inventory file and the title is found to be located at a referral library, the request will be stored for transmission to the appropriate referral library indicated in the inventory file.

It is anticipated that the requests will not be immediately transmitted but accumulated (batched) for transmission at least once a day (more likely three or more times), probably at specified hours to assist the work flow at the referral libraries. Automatic dialing equipment at the NPC should obviate the need for manual intervention in this process. The referral libraries will report their fill activities once a day. A log of all transactions will be kept for accounting purposes and for analysis of the workload of each library. The demand data accumulated in this process will be added to the selection file.

Other Considerations

Completeness of Cited Holdings

While there is some advantage to recording only complete volumes in the holdings statements of titles held in the referral system, it has been suggested that a relaxation of this requirement is in order for these reasons:

1. The NPC will not have the same degree of control over the holdings in other libraries as it has over its own.

2. To fill gaps in referral library collections will be more costly and less manageable than filling those in the NPC collection.

3. The referral library titles represent titles of lower demand, so the chance that a missing issue will be requested is also lower.

The advantage of listing holdings that are substantially complete, thus providing access to more volumes, outweighs the disadvantages of processing a small number of requests that cannot be filled. This is an area in which some operational experimentation will provide the most useful guidance.

Location Mechanism

There will always remain a segment of titles outside the NPC control mechanism. It may well be desirable to establish eventually an ancillary reference service in order to assist libraries in finding possible locations of hard-to-find titles not under NPC control. This service would be based on the collection of finding tools (union lists, etc.) of other organizations and on the subject expertise gained by NPC staff in the collection development process. In some ways such a service would complement the collection development process, since it would provide a source of data on the demand for titles not under NPC control. A current model for such an activity is the Research Libraries Group's Bibliographic Center at Yale University.

In the model proposed here a citation would be sent to an established office within the NPC where one or more locations would be sought by using an existing collection of union lists, data bases, library catalogs, etc. Location data would be reported back to the requesting library and the responsibility of the NPC would end there. This service should be a cost recovery one, based on an average search time. Difficult searches would be terminated after a specified span of time and any results relayed to the requester. This operation would provide a useful service to the library community and add data to the

selection process. It could also provide the basis for operation when the NPC relaxes its limitation of accepting only requests for material listed in the finding tool. It is not recommended that this service be established during the first two operational years of the NPC, since the emphasis at that time should be on developing the collection under NPC control.

DELIVERY

Once a request has been received and processed the resulting document must be delivered. As stated earlier, the document will in most cases be either a microfiche or paper photocopy; the exceptional case will be when the issue itself may have to be sent. This should occur, however, less than 1 percent of the time. Such requests indeed may be shifted to the referral library system.

While the NPC is phasing into full operation and refining its systems and procedures, it will rely on the United States mail as the principal means of document delivery. For the most part, items will be mailed first class to requesters. While this is more expensive than other available classes, it assures the fastest mail delivery. When other NPC systems are running smoothly and the center has opened its doors to most libraries, it can start to experiment with other delivery services or combinations of service. Air freight in combination with the mail might be tried to move batches of documents into those geographic areas in which the Postal Service offers a one-day guaranteed delivery. The use of such commercial delivery services as United Parcel Service (UPS) or bus can also be explored.

Interinstitutional delivery systems exist in some metropolitan areas. If a fast means of delivery to the central node of such a circuit can be made via air freight, UPS, or some other means, these private delivery services might reduce delivery times for member institutions. Obviously such arrangements will vary from location to location and will take time and experimentation to develop.

None of these delivery modes deals with the apparent delays that are attributable to individual institutions and the manner in which they handle incoming mail. In order to circumvent some of the institutional mail system delays, libraries could ask the NPC to mail material directly to the requester. This will require a change in operating style for some libraries, but the improved response time may be worth it to the user.

The NPC will also investigate the use of facsimile transmission of documents. However, existing equipment is slow, expensive to purchase, and labor intensive. There are also problems with the resolution of the image in terms of clarity of small print and graphics, but advances are being made in all of these areas. The critical question is whether such a service can support itself. If users are willing to purchase the required and compatible receiving equipment and pay the communication costs as well as the extra fee for the added labor required at the NPC to operate the equipment, some experimentation is warranted. Certain funding agencies might well be invited to support these tests.

There is some necessary internal preparation for each document the NPC will deliver. It is anticipated that the mailing label will be generated from the library's account number file. One method is to produce a sticky label that can be attached to the envelope. But in the case of mailing microfiche it might be less expensive to print a fiche-size card that slips into and can be seen through a window envelope or plastic package. This is particularly true if the card can also be used as the picking or request card that will be used by the NPC staff.

The NPC should also consider presorting by zip code, even though there is no economic advantage or requirement to do so for first-class mail. First, an abbreviated form of sorting will have to take place if

the types of delivery services mentioned above are used. Second, if the volume of requests is large enough and the procedures conform to standard mail practices, it might be possible to circumvent some of the local post office operation and thus speed delivery.

In summary, for the most part the NPC will have to rely on the U.S. mail for the bulk of its delivery. There may be ways to expedite that service by internal procedures, by using other delivery services in specific areas, and by working closely with the Postal Service. Finding the right mix of delivery services will take time and experimentation and so must wait until the other components of the NPC are running smoothly. The use of facsimile transmission is possible, assuming some improvements in equipment and a market willing to bear the cost. Facsimile transmission should be a cost recovery service of the NPC.

PRESERVATION

In order to assure continuing availability of periodical literature, it will be necessary for the NPC to provide long-term preservation of that literature against deterioration and damage from all causes including use, abuse, environmental factors, biological agents, fire, flooding, and other disasters. Given such a preservation commitment and because the NPC collection can be expected to grow in breadth and depth as well as, possibly, in type of publication (e.g. monographs), it would be appropriate and logical for the NPC to become a major element of the developing national preservation program.

Materials acquired by the NPC will, from the preservation standpoint, be of two types: those to be retained permanently (or at least for a very long time) and those that are expendable because they can be replaced easily or because they are to be converted to microfiche in the near term. Some materials will be acquired as individual issues, either current or retrospective. Others will be acquired as bound volumes of retrospective issues or in microformat, primarily microfiche. All material will be processed according to type.

Preservation will be accomplished largely through converting to microform those periodicals not originally purchased in that format. However, the capability of converting all hard-copy acquisitions may not exist at the NPC in the early years. By relying on the referral system

libraries to preserve those titles that they have agreed to service, the NPC will be relieved initially of the need to collect a high proportion of all periodicals and can concentrate instead on collecting those having heavy or moderate use. The referral system will aid the NPC in preserving periodical literature as well as in improving access to it. But as funds become available through a stable subsidy and processing fees from a steadily rising demand, the NPC itself will mount an effort to microfiche every title received.

Material Acquired in Hard Copy

Each hard-copy item will be examined after technical processing to determine whether:

1. It is to be converted to microfiche. Generally this will be done only for current high-demand titles, for oversized materials (over 11 3/4 inches tall*), or for material that is too deteriorated or fragile to withstand shelving and subsequent handling. Many, but not all, of the items microfilmed will be discarded immediately after filming or relatively shortly thereafter; they will not, therefore, require deacidification.

2. It would suffer significant damage from deacidification treatment.

3. It should be fumigated. This is relatively unlikely except for a limited number of shipments of older retrospective materials.

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*By limiting the paper copy collection to materials no taller than 11 3/4 inches, shelving in the NPC stacks can be uniformly spaced with no requirement to adjust them in order to accommodate the taller materials. The savings will be in operations that require relocation of material.

Each item will be marked to indicate its classification with regard to conversion to microfiche, fumigation, deacidification, and retention period. Those hard-copy items requiring fumigation will be treated in a standard Vacudyne processor with carboxide or an equivalent fumigant before being deacidified. Those items that do not need fumigation will go directly to a deacidification unit, provided that they have not been marked to indicate either susceptibility to damage from processing or that they do not require deacidification because they are not to be retained for an extended period.

After fumigation and/or deacidification, hard-copy materials will be marked to indicate that they have been processed and then will be shelved as explained in the chapter on storage and retrieval. Titles to be retained in paper will not be bound by volume but may be bound as individual issues when demand warrants such treatment.

The storage area for hard-copy materials will meet the following specifications:

1. The temperature will be kept between 55 and 65 degrees Fahrenheit. The temperature will not vary more than five degrees Fahrenheit in a 24-hour period.

2. The relative humidity will be kept between 45 and 55 percent and will not vary by more than 6 percent within a 24-hour period.

3. The air will be dry filtered to eliminate 95 percent of particulate matter, washed with water having a pH of 8.5-9.0, and charcoal filtered to remove oxidants.

4. The lighting will be controlled so as to hold radiation in the ultraviolet portion of the spectrum to a minimum. In those stack areas containing little used material, lights will be turned off except when employees are actually working there.

5. An automatic fire suppressant system such as Halon 1301 will be incorporated.

6. The NPC site will be selected and the building designed or modified so as to minimize danger of flooding.

7. Stringent good housekeeping procedures will be enforced to preclude damage from dust, spillage, animals, and insects.

Periodically a carefully selected sample of materials in the stacks and microform storage areas will be checked to determine the effectiveness of the preservation techniques in use. A replacement copy will be sought for any item that is badly worn or deteriorated. If replacement is not possible, a film or paper copy will be made of the item.

As funds become available, all materials received by the NPC will be microfilmed in order to assure continuing access to the material. During the early years of the NPC, funds are not likely to be available for total microfilming and so choices must be made. It has been calculated that filling requests from the microfiche file costs less than filling requests from paper-copy storage. There is an algorithm based on the frequency of demand and cost of fulfillment that determines when a title should be filmed and when it should be stored as paper copy. Since the decision point is a function of demand, titles should be filmed according to the list, ordered by demand, of titles requested. Filming for purposes of efficiency of response to requests should not be considered a preservation cost but should be attributed to operation. The cost of filming all other titles, though facilitating response times to a degree, should be considered a preservation cost.

Those hard-copy items that are to be filmed rather than stored in their original format should be separated after they are checked in from those items to be stored. After filming, each original will be marked to indicate that it has been filmed. The camera negative will be duplicated by roll-to-roll duplication to produce two printing masters of each fiche. These masters will be cut into separate fiche and retained at the NPC. One will be kept in the active file to be used for generation of hard-copy or distribution fiche as described in the following chapter on reprographics, and the other will be stored locally in a backup file

so that it may replace the active file copy if the latter is lost or becomes too worn to make good copies. The backup file will be stored in the same environmentally controlled area as the hard-copy documents. The rolls of camera negatives will be cut into individual microfiche and stored off site in accordance with the then current ANSI (American National Standards Institute) standard for archival storage of silver halide film. Thus camera negatives will be available for making new printing masters if necessary.

Material Acquired in Microform

Microforms acquired by the NPC (as opposed to those produced by it) will be handled and stored in accordance with the future availability of replacement copies, the type of microform (roll film or fiche), the quality of image, and the type of microfilm (silver, diazo, or vesicular). While every effort will be made to acquire only high-quality silver halide microfiche, it is quite likely that some microform acquisitions will be in roll-film format on nonsilver stock. It is also likely that some will be of limited resolution and contrast and of nonarchival quality. Specifically, microform acquisitions will be processed as follows:

1. Silver film, whether camera film or subsequent generation, that has sufficiently good resolution and contrast and is of archival quality will be treated as if it were camera film produced by the NPC (see above).

2. If feasible in terms of image quality and economics, roll-film acquisitions will be photo-optically converted to standard 98-image silver microfiche of archival quality. These fiche will be treated as if they were NPC-produced camera film. Roll film that is not to be converted to microfiche will be stored in closed containers in an area where the temperature and humidity are moderate and do not fluctuate more than a few degrees or a few percent from day to day.

3. Microform acquisitions for which there is no clear way of obtaining replacements should be duplicated onto silver film regardless of the image quality. The copies will be used for making distribution copies and the original acquisitions will be archivally stored off site.

REPROGRAPHICS

Without modern reprographic technology, an NPC as projected would not be possible. The majority of articles furnished by the NPC will be in either microfiche or paper photocopy form. The paper photocopy will be produced by office copying machines. Whenever possible material for the NPC collection will be acquired in microfiche. The microfiche will be of the best quality available so that one or more subsequent generations of duplication will be practical.

The following description of the reprographic activities of the NPC briefly touches on the closely allied functions of preservation and of storage and retrieval. These functions are discussed in detail in other chapters of the plan.

Microfiche is the preferred medium for storage, retrieval, and duplication at the NPC because:

1. Microfiche require a minimum of storage space, a compaction of about 95 percent being a commonly accepted index of advantage over paper copy.

2. Properly manufactured, processed, and stored, silver halide microfiche can be expected to have an effective life of hundreds of years.

3. Microfiche can be quickly and inexpensively duplicated or converted to paper form for delivery to requesters.

4. The standard dimensions and small size of microfiche make them relatively easy to store, retrieve, and refile.

5. Duplicate microfiche can be easily and quickly packaged and inexpensively mailed; several hundred pages can be mailed for the minimum first-class postal fee.

Despite these advantages, it may not be possible to use microfiche as the storage format for all NPC materials because it may not be economically feasible to convert little used titles to that medium. Further, some material, such as maps and other scaled items, may not be amenable to reduction. In addition, some retrospective materials may be available only on roll film, which may not be technically or economically feasible to convert to microfiche of good image quality.

For a variety of reasons all items will be available to requesters in paper photocopy form. However, to encourage the use of microfiche and in recognition of its cost advantages, there will be a discount for all materials supplied from the NPC collection on microfiche. In a small percentage of instances it may be necessary to arrange to lend an original periodical issue rather than to make a film or paper copy. This may happen, for example, when color, texture, or some other "noncopiable" characteristic of an original is essential to the user's purpose. If a situation like this can be predicted at the time of acquisition, it will be desirable to acquire two copies of the item and thereby protect the integrity of the collection against the possibility of loss of the item while it is away from the NPC. When it can be determined that an issue or title falls into this special category, it should be so marked during technical processing. An alternative to lending these special items from the NPC collection itself would be to use the referral libraries. The NPC might purchase such items and place them for access purposes in a designated referral library. The NPC would not then have to devise a special circulation system for a small number of items. This approach does not solve the "lost in transit" problem, however.

It is also possible that certain popular or relatively popular titles should be acquired or recorded on color film and either duplicated on color film or fiche or reproduced in color on photographic paper. Alternatively, these special items might be copied from the original using an office copier with color capability, but this is an unlikely possibility. Again, the referral library system might assist in providing access to these special-condition materials, perhaps by lending originals in some instances.

While these special copying services need to be planned, their implementation should proceed in accordance with demand; they should not be made available during the first years of operation.

In-house Production of Microforms

After it has been checked in, all material to be converted to microfiche will be prepared for filming by checking pagination, removing such extraneous matter as staples, cutting the pages apart, smoothing pages, inserting filming targets, and so on. Every batch of material to be filmed will be accompanied by a punched paper tape bearing microfiche header information for each issue in the batch. The tape will be prepared as a part of the check-in process and will be mounted on a reader built into (or electronically linked to) the microfilm camera. Alternatively, header information may be recorded on magnetic tape or disk and be transmitted to the camera from a remote computer site or read in by a unit that is part of the camera. One such improved header generator is expected to be available this year. It will significantly increase the effective speed of the camera for which it has been designed. In a few years it may be possible for the camera operator to initiate the recording of a header on film by means of a mechanism such as a bar code reader, which acts on a label placed on the document during the check-in process. Besides increasing throughput speed, this would increase accuracy and thereby reduce the volume of refilming.

The cameras used for in-house filming would be of the high-speed, automatic, step-and-repeat variety. With the Documate II, for example, a single operator can record more than 2,000 pages an hour by using a variety of automatic page-handling features.

The product of these cameras is silver halide microfiche in continuous rolls. In most instances a periodical issue will be complete on one or two microfiche. There will never be more than one issue on any one fiche. This technique will facilitate storage, retrieval, and duplication. The rolls of exposed film will be processed and then duplicated on silver halide stock using roll-to-roll duplicators. The original roll and one copy will be archivally stored at separate external sites. A second duplicate roll will be cut into separate fiche, which will be put in envelopes and stored at the NPC for quick retrieval. This set will be used for making fiche distribution copies. Fiche-to-fiche duplicators, such as the Datagraphix Model 76, will be used. Paper copies will be made by means of high-speed fiche-to-hard-copy printers, such as the Xerox 970 which is capable of turning out up to 2,000 pages an hour.

If a sales relationship can be developed betweeen the NPC and the publishers of heavily requested titles, multiple copies of the issues of those titles can be made initially and inventoried for quick retrieval and distribution on demand. This will reduce the cost of and the time required for producing a duplicate.

Distribution fiche will be put into fiche envelopes and automatically wrapped along with an address form. Paper copies will be wrapped in the same way and both types of packages dispatched by first-class mail.

Copying from Paper Originals

Much of the NPC collection will be acquired in its original printed form, preferably as individual issues but in some instances as bound volumes. Copies of articles in these periodicals will be made by

copying machine. In most instances it will be possible to record two original pages on each sheet of copier paper by utilizing copiers having large platens and lenses that reduce the image by a factor of about .25; that is, the dimensions of the copy are about three-fourths the dimensions of the original. This technique almost halves the cost of copying and greatly reduces postage costs for many items. Further reduction in postage may result if special lightweight paper is used for copying, although at this time such paper causes more jams in copiers than does heavier paper. Two-sided copying will also reduce postage and paper costs.

Some issues and volumes with tight bindings and/or narrow gutters will have to be copied one page at a time using a copier having a book-copying platen. Some volumes in poor physical condition may also have to be copied in this way in order to reduce the risk of damage to the volume. It may even be necessary to copy from especially fragile volumes by microfilming, since repeatedly turning such a volume face down on a copying machine can do much damage, particularly if it is a heavy book. However, because most fragile volumes are relatively old, it is unlikely that there will be much demand for copies from them. Also, because of the NPC's preservation function, these seriously deteriorated items should be converted to microfiche as soon as possible anyway.

Each article photocopied will be physically associated with the requester's address information on the "picking slip" so that the copy, with address on top, can be passed through a packaging machine in preparation for mailing.

COLLECTION STORAGE AND RETRIEVAL

The NPC storage and retrieval system must:

1. Provide a logical arrangement of the collection and an efficient layout of the storage units.

2. Be compatible with preservation requirements.

3. Provide for easy and reliable shelving.

4. Be expandable and flexible.

5. Minimize the distance an item travels in going from storage to copying equipment and back to storage, especially those items in heavy demand.

Storage of Microforms

The compaction afforded by the standard dimensions of microfiche makes it possible to store a large collection in a single room of modest dimensions. For example, a year's cumulation of 10,000 periodical titles on fiche can be stored in three to four fiche cabinets, each having approximately the same dimensions as a standard four-drawer filing cabinet. But, for reasons of efficient access, all microfiche printing masters should be kept in powered, rotary storage cabinets arranged so as to be convenient to fiche duplicators located in the same room.

Each fiche will be marked with a unique number and will be filed sequentially according to that number. A diagonal stripe will be marked across the tops of the fiche in each drawer to assist in the prevention of misfiling.

When an issue is recorded on two or more fiche, each will bear the same unique number and an issue sequence designation, e.g., "2 of 3 pp. 96 - 193." All the fiche making up an issue will be kept in a single envelope.

The retrieval and refiling operation for microfiche will proceed as follows. Using a computer-sequenced list of fiche numbers corresponding to requests addressed to the NPC, a searcher will remove the associated fiche sets and their envelopes from the file, leaving a marker of contrasting color in place of each set. The fiche sets will be carried by the searcher to the operator of a fiche duplicator or fiche-to-paper copier depending on the character of the request. After the item has been copied, the searcher will pick up the masters -- still in filing sequence and in their envelopes -- and proceed to refile them and remove the markers. When searchers pick up the masters that have been duplicated, they will also deposit for duplication the next batch of fiche that they have pulled in the interim.

If it is feasible in terms of arrangements with the appropriate publishers to make multiple fiche copies of the more popular titles in anticipation of demand, production costs and request fulfillment time will be greatly reduced. At the same time the space requirement for fiche storage will be increased. Should this approach be possible, the printing masters will be stored in rotary files, as detailed above, but the duplicates will be kept in batches, possibly in a pigeonhole arrangement with the unique number marked below each batch. Each fiche set (one issue) will be in an envelope in order to keep individual sets together. As an indication of the space required, it is worth noting that pigeonhole storage for fifty copies of eleven issues (one year) of 5,000 titles could be set up in a room about fifty feet square.

It is possible that a small percentage of the working collection will be on roll microfilm. This file should be kept on reels in microfilm cabinets in the same area as the microfiche collection. An appropriate number of reader-printers equipped with quick threading take-up reels should be nearby so that plain paper printouts can be made rapidly. No effort will be made to provide film copies of materials held in roll microfilm. Because of the exceptional nature of the procedures required to handle roll microfilm, as little material as possible will be acquired in this format.

Storage of Printed Periodicals

Paper copies of periodicals, whether individual issues or bound volumes, will be stored upright on bracket shelving. There will be separate bays for each year of publication for materials published after the NPC becomes operational and one or more bays for materials published prior to that time. Since prospective materials will arrive as separate issues and will be more amenable to copying if left unbound, they will be kept in tough, lightweight containers similar to pamphlet boxes. The top six shelves of each section will hold a total of sixty such containers (each approximately 10 1/2" high and 3 1/2" wide), the seventh shelf being reserved for expansion.

The issues making up an annual volume will be stored in one or more adjacent boxes and only one title will be stored in any particular box. Within a bay, titles will be shelved according to the sequence in which the first issue of each is received. One or more additional adjacent boxes will be set up for a title if the thickness of the first issue implies they will be required. For the most part, however, it is expected that all the issues of a volume will fit in a single container.

Within the prospective collection, each box will be labeled with a four-part alphanumeric designator intended to facilitate rapid retrieval and refiling of issues: (a) a bay identifier consisting of a two-digit number representing the year of publication, (b) an alphabetic aisle identifier, (c) a numeric section identifier, and (d) a number between 1 and 120 (inclusive) indicating sequential position within a two-section span of shelving. Thus the box(es) containing the first volume in a range will have the integer "1" as the fourth part of its designator, and the next volume will be in one or more boxes having "2" for the corresponding designation. The last volume on the sixth shelf of a two-section span will have a number less than 121 and the seventh (bottom) shelf of each section will accommodate the expansion resulting from volumes requiring extra boxes. To assist with refiling, a diagonal stripe or other similar mark will be placed across the spines of the issue making up an annual volume.

A numbering scheme similar to that described above will be used for the retrospective collection. Both prospective and retrospective bays will have expansion areas adjacent to them. The schematic appearing on page 96 illustrates this expansion technique. Because some of the volumes in the retrospective (pre-1979) bays as well as those in the expansion areas of the prospective bays will be bound, it will be necessary to put the four-part alphanumeric designator on labels affixed to spines and/or shelves.

In conjunction with the boxes used to store unbound issues, hardboard-backed foam pads of several different thicknesses will be used to keep the issues from sagging in partially filled boxes.

Because the expenses of heating, cooling, and otherwise maintaining an environment conducive to the preservation of the NPC collection will be a major cost factor, the building will have movable interior walls, well insulated and sealed on all edges. The walls will be repositioned every year or two to open new stack areas. The timing of each repositioning of the walls and the dimensions of the newly opened areas will be determined on the basis of relative costs. It may also be useful to include in this evaluation the costs, savings, and other benefits associated with converting some of the paper to microforms. As energy and labor costs rise and paper copy deteriorates, microfilming will become more and more cost beneficial.

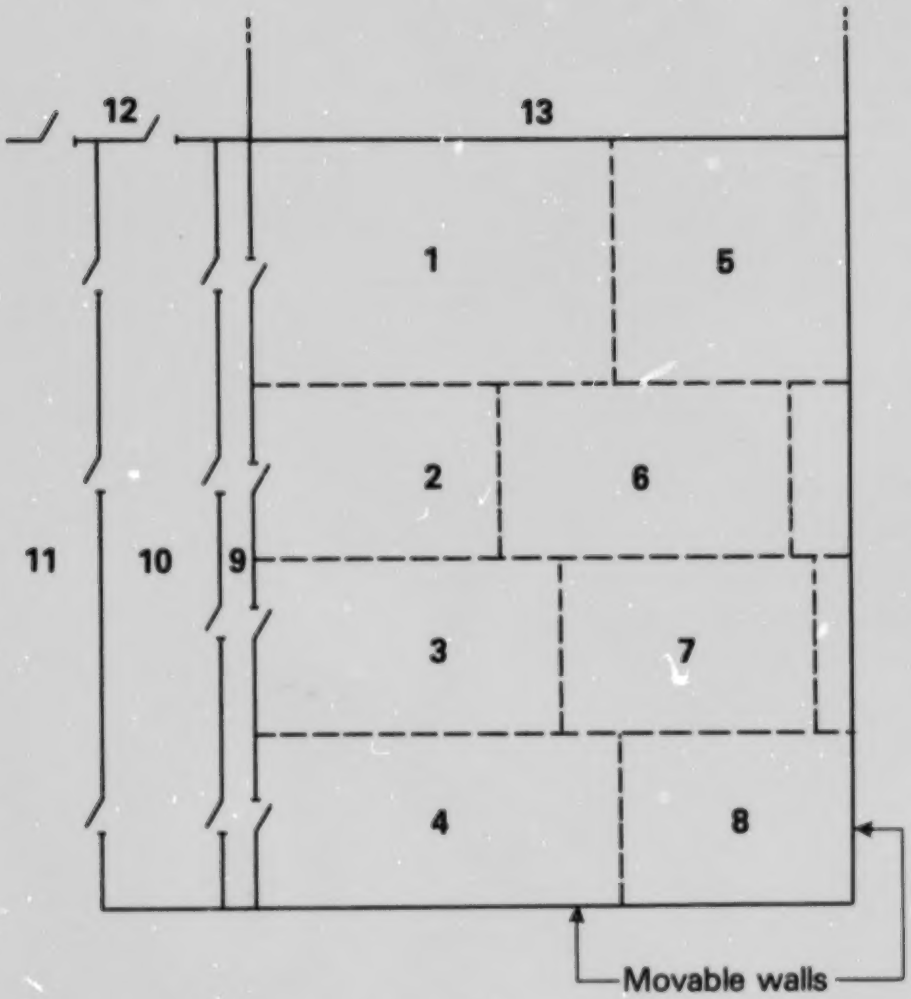
Along one side of the stacks an area will be set aside for copying and packaging operations. The geometry of this arrangement will allow copying machines to be repositioned and augmented as necessary to keep them adjacent to the most active stack areas. It will probably be necessary to erect a double wall with automatic doors -- a kind of environment lock -- between the stacks and the copying and packing area in order to keep the controlled environment in the former from being contaminated by conditions in the latter.

As the collection begins to age and older retrospective materials are acquired, the NPC will have increasingly large sections of infrequently used material. Such material will be moved in blocks, selected according to usage and age, into compact storage units. For the least-used items, particularly those in poor condition, consideration will be given to low temperature storage on compact shelving or to microfilming. It is not expected that either technique will need to be used during the first few years of NPC operation.

If the stacks become filled and cannot be relieved by filming or moving materials to compact or low temperature storage, it will, of course, be necessary to build additional storage facilities. Therefore, it would be well to design the center so that it can be expanded modularly either vertically or laterally as additional space is needed.

The following schematic illustrates how the collection might be arranged in one area of the NPC at the end of the third year of operation.

Floor Plan of NPC Stack and Copying Areas



Legend for
Floor Plan of NPC Stack and Copying Areas

1. First year of retrospective collection (items published prior to opening of NPC).

2. First year of prospective collection.

3. Second year of prospective collection.

4. Third year of prospective collection.

5. Expansion space for second and third year additions to retrospective collection.

6. Expansion space for second and third year additions to first year of prospective collection.

7. Expansion space for third year addition to second year of prospective collection.

8. Expansion space for subsequent additions to third year of prospective collection.

9. Double-walled environment lock.

10. Copying and shipping.

11. Microfilm storage and request fulfillment area.

12. Administrative area.

13. Technical processing and computer areas.

Future Storage and Retrieval Techniques

Storage of hard copy whether paper or, to a lesser extent film, requires large space commitments. In addition, the stored material is subject to deterioration through routine handling and by certain chemical changes that take place over time. No matter how efficient the NPC becomes, access to these materials from the ultimate user's point of view is bound to appear slow and cumbersome. The best of all possible worlds for this hypothetical user would be a circumstance in which the user could sit at a terminal and scan a variety of articles that may be useful. Once the articles with the most direct relevance to the user's requirements are found, the user could press a key and have the hard copy produced on the spot.

Several elements that could contribute to this scenario already exist. First, several publishers now produce the text portion of their periodicals from machine-readable data. Other publishers are exploring the possibility of converting to this method of reducing publication costs. Graphic and illustrative materials still are not being handled as machine-readable data, but progress is being made in this area.

A second element is the present employment of high density storage systems -- systems capable of trillion byte storage using images recorded on mylar film by laser technology. As this technology develops and becomes more common and less costly, it will provide a means of storing huge masses of data such as the text and graphics of periodicals as a by-product of the publication process.

Yet a third element is optical character recognition (OCR) technology which is well developed. OCR could be used for the encoding of large masses of printed material (including microfilmed materials) into machine-readable form for storage in a high density data storage system.

Yet a fourth element is the video system developed and marketed by the British which allows subscribers to call up specific pages of an "electronic newspaper" for at-home browsing.

Couple all of these elements with the communications technology that is already at hand, and a storage, retrieval, and transmission system has been created. The NPC will not open for business with such a sophisticated system, but the NPC could provide the locus for the development and testing of these pilot systems. NPC management must be aggressively involved in the developmental stages of this technology.

Large-scale implementation of a storage, retrieval, and transmission system similar to the one described above would require increased equipment costs, but offsetting reductions in personnel eventually should be realized. Of course request response time should fall at the same time that the option of remote browsing and selection of articles is provided. A peripheral benefit of the system will be the more permanent storage of data -- even approaching the ideal of perpetual preservation.

COMMUNICATIONS

This chapter describes how requests will be transmitted to the National Periodicals Center, how their arrival will be acknowledged, and how they will be retransmitted when necessary to the referral libraries for fulfillment. Further, this chapter describes the internal communications required by the NPC in order to handle the flow of information between the host processor and the terminal devices located throughout the NPC facility. Greater technical detail on electronic communications is provided in Appendix B, page 181.

Initially, existing transmission services like the U.S. mail will be used for requests in hard copy; for those in machine-readable form electronic transmission (TWX, TELEX, Dataphone, etc.) via a common carrier will be employed. The basic data collection principle will be source data automation (SDA) where feasible. For the purposes of this plan, SDA can be defined as a method of recording data in machine-readable form at or as close to the source of the request as possible. This will allow for the data in and about the request to be captured and reused as often as necessary without having to rekey the original request or any part of it. Once the data is captured in machine-readable

form, some of the high costs of clerical labor and the more costly professional value judgments can be eliminated.

It is intended that the communications, or front-end, processor will be separate and distinct from the host processor or mainframe. This modular approach will allow for growth in the communications load without inhibiting expansion and upgrading of the processing mechanism necessary to accommodate the load. At the same time, this will allow for a modular approach at the data-processing level that is concerned with day-to-day manipulation of the various records and files. Changes to one processor will be independent of the other. A software and/or hardware change for one module, for example, should not affect the operating results in the other.

The principal data elements associated with a request will be the following:

1. Institution identification will be based on the proposed Standard Library Identification Number (SLIN) currently under development by the American National Standards Institute Committee on Library Work, Documentation, and Related Publishing Practices, Z39. Lacking that standard, an institution identifier similar to the concept of the SLIN will be employed by the NPC in order to accommodate accounting and bill-to/ship-to variations.

2. The item identifier will be based on the International Standard Serial Number and the key title. Should these elements not yet be available for a specific title, the item will be identified by the NPC in the finding tool with a temporary number and a provisional key title.

3. The specific item requested will be identified by volume, issue, and date. Requests for specific articles will also include author, title, and pagination.

4. Requesters will also designate whether microform or photocopy is desired.

Forms of Communication

Although this chapter is primarily concerned with electronic communications, it should be noted that requests arriving in hard copy through the U.S. mail will differ from electronic communications only in that the time of transmission between origin and receipt will be greater. Once a mail request has arrived at the NPC, the data will be transcribed into a machine-readable form by NPC staff. Following transcription, the request will be processed through the system like any other request received by electronic means. As indicated earlier, institutions that mail requests to the NPC will pay a premium because of the added costs associated with transcribing the data into machine-readable form. The premium will be the cost of the mail request form. Because there are methods available today that reduce human intervention, it is reasonable to envision the use of some machine-readable data on the preprinted mail request forms. Optical character recognition and magnetic-ink character recognition are two possible data-capture systems that need to be explored in order to determine the feasibility of incorporating one or the other into the preprinted forms and so provide for increased speed of processing and less costly transcription.

Many libraries currently lease, own, or have access to a teletypewriter (TTY) or a TTY-compatible terminal. It is anticipated that most requests will be transmitted to the NPC using such a device. At the outset, electronic communications will be accepted from either of two carriers: Western Union Telegraph Company or American Telephone and Telegraph Company. Data arriving via TWX, TELEX, and Dataphone services will be handled on a quasi-interactive basis during prime hours. At some future date, requests might be accepted from a variety of sources such as a dedicated analog voice circuit, a digital data service, or one or more of the other commercial data-handling networks (e.g., TYMNET and

TELENET), which offer potential cost savings. But initially electronic communications will be limited to voice-grade lines or below and most likely to a rate of 100 words per minute for most institutions. Initial operation may include the use of INWATS (Wide Area Telecommunications Service for incoming traffic) if it can be shown that cost savings can be effected when INWATS costs are compared with the collective costs of unit tolls by individual requesting institutions.

In addition to all of these modes of communication, it is envisioned that requests might be accepted on an experimental basis by voice communication between a requesting institution and the NPC, similar to current airline reservation systems. Thus an NPC terminal operator would enter the data provided by the requesting library during a telephone conversation. In order to introduce the data in a cost-effective manner, requests of this nature will necessarily follow a formatted sequence of elements that will be appropriately described in a user guide.

The NPC should not develop an autonomous telecommunications network. Following the implementation of the bibliographic component of a national library and information service communications network, it can be assumed that a major portion of the electronic communications will be handled by the national network. By then it will be possible to handle all requests introduced into the NPC via the national network on an interactive basis.

Early in the development of the NPC, efforts should be made to link ILL requests with literature searches from a wide variety of data bases. Such a link would produce accurate requests as well as the prompt transmission of them to the NPC. Similarly, access from other networks, e.g., the BALLOTS Center at Stanford University or OCLC, Inc., should be facilitated and encouraged.

Operating Parameters

It is anticipated that up to 500,000 requests will be handled by the NPC during the first year of operation. The current assumption is that 85 to 95 percent of these requests will be received in machine-readable form via common carriers. For planning purposes, 90 percent of the requests arriving at the NPC beginning with the second year and onward will arrive in machine-readable form. Between the second and third year of operation, it is intended that some broadband communications capabilities will be introduced. A dedicated analog or digital line, for example, might be used to connect the NPC with one or more of the bibliographic networks. Single large institutions, on the other hand, might communicate with the NPC via a commercial network.

For planning purposes and based upon existing ILL request formats, it is assumed that the average single request will contain less than 500 characters per message including header and trailer information. For messages composed of multiple requests, it can be assumed that the average message length will be reduced by a factor of at least 20 percent, i.e., an overall average of 400 characters or less per request in a message containing multiple requests.

The front-end processor will handle both external and internal communications. External communications are defined as those messages consisting of header information, body or message text, and trailer information for traffic coming into and leaving the NPC. Incoming messages will be composed of interlibrary loan requests, as well as acknowledgments of interlibrary loan fulfillment from those institutions providing referral service. Outgoing communications traffic will consist of NPC acknowledgment of the receipt of ILL requests and the rerouting of requests for titles that are held by referral institutions. Incoming messages will be handled on a quasi-interactive basis, in contrast to a batch-transmission basis, in order, when possible, to acknowledge receipt of the message(s) as well as to assure the requesting institution that the item is held and that there are no missing or garbled data elements. This is particularly important for messages received during prime time since it can be assumed that speed

is of the essence. For certain critical data fields, the need for redundant data will be investigated as a safeguard against typographic errors and communication line problems such as noise and distortion.

For NPC purposes, internal communications will consist of those transactions into and out of the host processor or mainframe. Specifically, the front-end processor will be responsible for handling the data flow between the mainframe and terminal devices located throughout the NPC facility. All processors handling internal transactions will be interactive with some (limited) dynamic update capability.

Communications Equipment

In order to identify off-the-shelf hardware and software appropriate for meeting these requirements, the following characteristics and functions of the communications equipment have been identified:

1. Verification and validation of user identification.
2. Polling and dialing.
3. Queuing and buffering.
4. Error checking, detection, and control.
5. Code conversion of multiple encoding schemes.
6. Line and message switching.
7. Mixing of input channels to obtain multilevel transmission speed capabilities.
8. Mixing of input channels to accommodate analog and digital transmissions.
9. Message logging (including clock time) and statistical counts.
10. Priority scheduling.

11. Line concentration (e.g., multiplexing).
12. Message reformatting for data input/output.

These elements are more fully defined in Appendix B, page 181.

BIBLIOGRAPHIC CONTROL

If the NPC is to operate efficiently, it must maintain a complete, accurate record of its own periodical holdings and those to which access is provided by referral libraries. Thus the NPC must establish a coherent system of bibliographic control using accepted standards. Since consistent application by the NPC of one standard will tend to promote the use of that standard by libraries in general, the NPC must choose a system that will facilitate future ILL activity within the framework of a national library and information system. The International Serials Data System provides a standard that should be adopted by the NPC.

International Serials Data System (ISDS)

Established within the framework of the UNISIST program of UNESCO, the International Serials Data System is an international network of operational centers jointly responsible for the creation and maintenance of computer-based data banks that contain essential information for the identification of serials. The aim of the ISDS is to provide a reliable registry of the world's serial publications. Its most attractive feature for the NPC is its responsibility for assigning to each serial a unique identification number, the International Standard Serial Number.

The ISSN can be used in processing ILL requests as well as in the ordering, check-in, and inventory systems of the NPC. Not all periodicals, however, have been provided with an ISSN, so for some journals the NPC will assign a temporary number to serve until an ISSN is assigned.

Previous chapters have made clear that the NPC will require libraries to use the ISSN on all orders as a means of uniquely identifying a specific title. Since the emerging national bibliographic system for serials in the U.S. will approximate the ISDS in many important ways, it will be to the NPC's advantage to also use other ISDS data elements from the beginning. While this method of control is not consistent with past cataloging practices in American libraries, it is fairly consistent with existing and proposed practices. It also is similar to the treatment of periodicals by abstracting and indexing services. Any system of control selected -- and ISDS is no exception -- will create some problems for libraries because of their inconsistent application of standards. The use of the ISDS will, however, capitalize on its international acceptance as a powerful force for standardization and cement it more firmly into the foundation upon which the U.S. will build a strong system of national bibliographic control.

The ISDS is building a base file of serial records, which now contains over 60,000 titles. Most of these are current publications. By the time the NPC starts to select and collect periodicals the ISDS file should contain records on over 90 percent of the current titles under consideration. ISDS data is also being added to the CONSER file of records. The NPC will probably use both files in its system.

In some cases the ISDS records will not parallel cataloging based on the Anglo-American Cataloging Rules, used by most libraries. Since ISDS records are always based on an ISSN and a key title, which serves as the main entry for the records, the NPC will follow this practice and always use the key title. Questions of choice of entry will never arise in the NPC.

Corporate Name Entries

One significant gap in the list of data elements supplied through ISDS is a provision for a consistent form of corporate name. Many periodicals are issued by business corporations, government bodies, associations, foundations, and other organizations whose names change almost as frequently as the titles of the journals they publish. Establishing control over corporate name headings, including cross references to the countless variant forms that occur, is fraught with difficulties even for a file of 36,000 titles. It is generally conceded that a sophisticated computer subsystem is needed to handle this demanding task. A practical and portable solution may be available by the time the NPC begins, but this is unlikely. Therefore, it is recommended that the initial bibliographic control effort exclude name authority control until a suitable subsystem is available. During this delay it is also hoped that a file of nationally acceptable name authority records will be created, thus further reducing the workload of the NPC staff.

Finding Tool

As mentioned in the chapter on access, the NPC in its early years will only accept requests for items cited in the NPC finding tool, produced from the NPC's machine-readable bibliographic data base. The finding tool will be issued periodically, at least once a quarter in COM-produced microfiche. The tool will contain two sections, the first listing all records arranged by ISSN and the second again listing all records only this time alphabetically by key and variant title. As soon as a name authority subsystem is available, other points of access such as corporate and personal names and uniform titles will be added. Sample entries for the finding tool are on the next page.

Part One: Alphabetical Order

ISSN 1234-5679 Archeological Society of Virginia — corporate name entry
NEWSLETTER - ARCHEOLOGICAL SOCIETY OF VIRGINIA*
1- ; Sept. 1954- Richmond. Monthly.
Holdings: 1- ; 1954-

ISSN 2345-6781 Catalogus faunae Poloniae. — variant title entry
KATALOG FUANY POLSKI. 1960- Warszawa.
Irregular.
Holdings: 1968-

ISSN 2457-8306 KATALOG FUANY POLSKI. 1960- Warszawa. — key title entry
Irregular.
Holdings: 1968-

ISSN 1234-5679 NEWSLETTER - ARCHEOLOGICAL SOCIETY OF VIRGINIA — key title entry
1- ; Sept. 1954- Richmond. Monthly.
Holdings: 1- ; 1954-

ISSN 2457-8306 Polska Akademia Nauk. Instytut Zoologiczny. — corporate name entry
KATALOG FUANY POLSKI. 1960- Warszawa.
Irregular.
Holdings: 1968-

Part Two: ISSN Order

ISSN 1234-5679 NEWSLETTER - ARCHEOLOGICAL SOCIETY OF VIRGINIA
Sept. 1954- Richmond. Monthly.
Holdings: 1- ; 1954-

ISSN 1234-8767 CENTRAL EUROPE JOURNAL. 14- ; 1966- Muenchen.
Monthly. Ceased publication?
Continues: Sudeten bulletin. ISSN 4321-0325
Absorbed: German news ISSN 8320-413X
Holdings: 14-15 , 18- ;1966-1967, 1970-

ISSN 2457-8306 KATALOG FAUNY POLSKI. 1960- Warszawa.
Irregular.
Holdings: 1968-

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*Key titles are shown in upper case for emphasis only.

TECHNICAL PROCESSING

This chapter addresses the options available to the NPC in selecting, ordering, and receiving periodicals to be included in its collection. The use of computer-supported systems is discussed in the following chapter on systems development. A detailed description of the various processing functions and the files to be used is located in Appendix C, page 199.

Selection

The selection of periodicals for the collection should begin before the NPC is officially established -- that is, after this report is accepted and before the NPC director is appointed. Assuming advance funding becomes available, a small staff of collection development personnel could select most if not all of the initial 36,000 titles. It is recommended that a copy of the ISDS file be used as the base file for this selection activity and that it be augmented with data from other files. This file could be made accessible using one of the existing bibliographic services such as BRS (Bibliographic Retrieval Service),

BALLOTS, or OCLC, Inc. A file of the selected titles (or of their ISSNs) will be drawn from the data base for the NPC ordering function. This data will be augmented with current price and publisher data and a machine-readable file of the 36,000 titles established so that they can be ordered en masse. The selection file can then serve as the base for other technical processing functions.

Personnel involved in the selection activity might also be involved in the bibliographic control activities. The close relationship between these functions would make such an arrangement a logical one.

Acquisition

One of the major decisions to be made is whether the NPC will use subscription agencies for a large percentage of its ordering or whether subscriptions will be placed directly with publishers. Using subscription agents will significantly reduce the volume of activity surrounding invoice processing and payment since fewer invoices are needed. Several agents can supply invoices in machine-readable form. Some have automated billing systems that permit them to include an order number or ISSN on the itemized invoice. NPC managers should give the use of subscription agencies serious consideration. In any case, at the time of order the NPC should require publishers and/or agents to place the appropriate ISSN on the periodical's mailing label.

Whenever possible the NPC should take advantage of two-year or three-year subscription rates, which will reduce the cost of individual titles by 3 to 10 percent. The NPC's budget flexibility will determine whether it can take advantage of such savings, since this might cause significant fluctuations in the acquisition budget. The fluctuations can be leveled over time, however, by distributing the two- and three-year subscriptions equally over the first three years.

The file used for acquisition and the bibliographic file, which controls the NPC collection, may not always contain the same number of records. For example, the NPC may acquire more than one copy of a

single title; one record would suffice for the bibliographic file, but a separate order record for each copy would be contained in the acquisition file. Or the NPC may issue a single order, but the publisher may send an additional title as a bonus or gift, resulting in more than one record on the bibliographic file, but only one order record on the acquisition file. The acquisition file might also have records that are not orders per se but cross references to other order records. For example, a single record might represent an order on which several titles are received, as in the case of a society membership for which the member receives several journals. There may also exist in the file orders paid for by the NPC but sent elsewhere. This mechanism is commonly used for the support of exchange agreements.

Receipt

During the second year of operation, the NPC will receive an average of 1,600 periodical issues per working day. While a number of large research libraries have effective manual systems handling this number of issues and more, it is desirable for the NPC to integrate this function with its ordering and inventory functions. It is obvious that the order placement and receiving functions must be closely related to facilitate invoice and claiming procedures.

The NPC will not have time to create its own check-in system during its first year. One option for checking in the majority of titles would be to use subscription agents for the task. The NPC might contract with agents not only to place orders for periodicals but to check in and, where necessary, claim missing issues. The agents would receive and process the issues on behalf of the NPC and mail them in batches to the center with a machine-readable listing of the contents of each batch. This record can then be used to update the inventory file. The National Library of Medicine (NLM) uses several subscription agents for this purpose. In their experience the real dollar costs of this option are less than they would be if NLM's own staff were to perform the same functions. Such an approach would decrease the NPC's staffing requirements and provide more time to develop an internal check-in system if that proved in the end to be necessary.

Part of the receiving function will be the routing of issues to the appropriate stack area, the preservation section, or the microfilming section. These forwarding instructions should be part of the machine-readable check-in record from which an appropriate routing label would be produced.

SYSTEMS DEVELOPMENT

The functional requirements of NPC operating systems as described in the previous chapter can be met by the judicious use of computer technology. Properly used computer technology is a necessity for the NPC since without it there would be little possibility that the NPC could fulfill its stated mission at an acceptable cost and with performance levels that exceed today's ILL performance standard. An analysis of file sizes and volume of transactions (Appendix D, page 237) suggests an operation of sufficient scale to warrant the application of computer technology. Development and installation of the NPC computer systems will be critical to the success of the NPC and must be given the highest planning priority.

The NPC will have the advantage of applying computer systems to a totally new operating environment rather than having to impose new technology on existing manual procedures as is so often the case. Working against this initial advantage will be the pressure on the NPC to demonstrate early results. NPC managers must guard against the danger of implementing systems before they are fully tested. There may also be a tendency at first to establish manual operations, with the intent of eventually replacing them with computer-supported systems, in order to expedite the acquisition of materials and the provision of

services. This approach should be resisted. Too much attention would be directed toward making the manual procedures work well with the result that the introduction of the computer system would be delayed. The NPC would then lose the advantage of starting from scratch with a machine system. Initially, the NPC should devote most of its staff to the acquisition, development, installation, and testing of its computer systems and to the design of those manual procedures that will complement the computer-based operations.

In developing the computer system, the first decision facing NPC managers will be whether to purchase computer software or to produce their own, totally new, package. Data-processing managers have generally preferred to develop unique systems for each application rather than to take advantage of the work of others. Thus little successful transfer and adaptation of applications software has been seen in the field.

Before NPC managers make a similar decision, they should consider carefully the dimensions of the problem to be tackled. Although it was early thought that the application of computer technology would have significant benefits for serials processing and control, several attempts in the last fifteen years have pointed up numerous difficulties. The experience of OCLC, Inc., which has had such an application under development for several years and has been able to implement only a portion of the total system, serves to illustrate the intricacies of on-line serials control. The fact that there are at present few on-line serials control systems in North America further emphasizes the difficulty of the problem.

NPC managers thus will be faced with a dilemma. They may not want to start a complex development program that requires long lead times, yet they may not be able to find a suitable existing system that could be adapted for NPC use. Even so, careful investigation of systems such as those in use at OCLC, Northwestern University, University of California at Los Angeles, National Library of Medicine, University of Minnesota, and Guelph University should be undertaken before a final decision is reached.

The decision on software is fundamental since selection of a particular hardware manufacturer, model, and configuration will depend on it -- particularly if an existing software system can be acquired. NPC managers will again have to determine whether they should operate their own hardware or purchase access to hardware that is managed by others. Both approaches need to be weighed carefully; there is no clear choice in this matter. The ultimate decision will depend on the location of the NPC, the hardware/software configuration selected, and the economics of the various alternatives. Using the system demand estimates in Appendix D, page 237 and assessing the volume of activity anticipated by the NPC in five years, including file sizes, the probable length of records, the volatility of records, and the potential number of input/output transactions, it would appear that for planning purposes, the NPC systems will require by the fifth year of operation the hardware capacity of a small- to medium-sized general purpose computer. By the fifth year the NPC could be checking in an average of one periodical issue every 10 seconds in one eight hour shift and one library request for material every 3.9 seconds in three eight hour shifts with peak loads considerably higher than the average. Of course some of the processing load can be moved from the mainframe computer and distributed to minicomputers. Such opportunities should be explored by the NPC staff for their cost benefits.

Modular Approach to Systems Development

The NPC will have only a short period of time to develop and/or deploy the computer systems needed for a smooth functioning operation. It must set its priorities of development early as suggested in the implementation plan. It must attempt to utilize existing software packages when practicable. It should rely on contractors to develop some subsystems. This will require careful planning, the preparation of detailed specifications, and watchful monitoring to ensure that each subsystem interfaces properly with the total system. The data-processing requirements can be categorized as follows.

1. Request Processing

    1. Communications.
    2. Request verification.
    3. Deposit account and sales control.

2. Bibliographic Processing

    1. Selection tools.
    2. NPC/referral library inventory.
    3. Finding tool.

3. Periodical Acquisition/Inventory Control

    1. Ordering.
    2. Check-in.
    3. Inventory control.

4. Administrative Support

    1. Payroll.
    2. Fiscal control.
    3. Accounts payable.
    4. Property accounting.

5. Research

A modular approach is highly desirable in terms of the flexibility of systems design and development as well as for systems expansion. Obviously the request-processing functions are most prone to significant and continued increases in the volume of transactions. It would be poor planning if an upgrade in equipment, required to absorb increased request traffic, would adversely affect other related

subsystems. One approach that would minimize this possibility is to design the request-processing subsystem on separate hardware in such a way that new similar hardware could be added without significantly affecting the subsystem interfaces.

Another advantage of using separate but similar hardware for the various subsystems is that there is a possibility of in-house backup in case of hardware failure. The subsystem with the highest priority should be the request processor. If it fails, backup is very desirable even if it means the technical processing subsystem must be turned off temporarily. A day's delay in processing orders and receipts is more tolerable in terms of work loads and public relations than if no requests were accepted for a period. The modular approach also allows more flexibility in the scheduling of systems development. For example, the NPC might contract for the use of a serials check-in system, while it develops its own process control system on its own hardware.

System Integration

There is no reason why the NPC has to use one computer to operate all of its systems, nor do all systems have to operate on NPC hardware. As already suggested, sophisticated bibliographic searching can be performed using external services (e.g. BALLOTS, BRS, etc.).

It is desirable, however, to have an in-house data-processing capability for processing requests. Since the technical processing subsystems will be required to pass new inventory data (including new titles) to the request-processing subsystem it is also desirable to have it on an in-house subsystem. By defining these as two different subsystems each can be developed independently as long as the interface is well defined. The same is true for bibliographic processing and its relationship with both of the above subsystems. Neither of the other two need complete bibliographic records, but data does have to be passed from one to the other.

While the above subsystems have to be tailored to NPC requirements, most of the administrative functions are similar to common business-type applications giving the NPC a wide choice of options with respect to the purchase of software packages or the use of outside computing services. The NPC should concern itself with the needs of the operating subsystems when choosing hardware, not with the needs of its administrative support system.

The last function for which computer technology may be amenable is research. It is unlikely that the type of hardware and software selected for the other operating systems will accommodate the occasional requirements to analyze large files of historical data. Outside systems and services can be used for these research purposes.

SITE CONSIDERATIONS

This chapter will describe the characteristics of an ideal location for the National Periodicals Center and the ideal building or buildings that will house the NPC. No attempt will be made to designate a particular geographic site or an ideal building regardless of site. The specific site selected should have the characteristics described below. Similarly, any structure that is selected or built specifically for the NPC should have the characteristics described in the second part of this section.

Characteristics of the Ideal Geographic Location

Arguments have been made to locate the NPC near Washington, D.C., in the Boston-Washington corridor, in Chicago or some other midwest city, and, of course, in California. Each general area has a set of advantages as well as disadvantages. No matter what the ultimate decision is, various trade-offs will have to be evaluated in arriving at

it. Location on either coast or in Chicago or the Denver area will force a future decision on where to locate subsets of the NPC when and if demand requires a decentralization of the service. If a decision is reached to decentralize the NPC, questions arise as to how much material would be duplicated in each location and how many locations would be needed. If an initial coastal (east or west) location is chosen, for example, another rather large facility may be needed on the opposite coast. On the other hand, an initial midcontinent location may result in the necessity of installing two smaller facilities on either coast. These arguments may prove to be specious if the communications systems of the U.S. enhance their capacities to serve the needs of the NPC and its users.

Communications

The ideal site will provide easy access to a variety of communications systems. Obviously, telephone service must be available at a reasonable cost.

In addition, access to a variety of communications common carriers will be necessary in order to deal with a variety of request access modes. Though the teletypewriter is the present de facto standard for machine-readable ILL communications, other channels and a variety of bandwidths will be necessary in order to accommodate the sophisticated requirements of some users.

Mail service must also be available; however, the nature of the service is critical. A major U.S. mail distribution center should be close enough so that two or more deliveries per day could be made to it from the NPC.

In order to have the capacity to explore and utilize alternate means of delivery of NPC products, both bus and UPS (United Parcel Service) or other commercial delivery services should be convenient to the NPC. It is highly desirable for the bus and commercial delivery service to be represented by major nodes in their respective systems.

If they merely feed a major node, much of the speed advantage that might exist with these forms of delivery will be compromised.

It will be necessary to have quick access to a major airport in order to open up the possibility of moving certain materials by air freight. Convenient air transport will be helpful for the additional purpose of moving people to and from the NPC, whether they are employees, suppliers, or visitors.

For future communications, TELENET and TYMNET nodes should be present. On the assumption that train travel will make a real comeback, the NPC should have direct access to the rails, although a siding at the NPC will not be necessary. In short, all means of communication and transport for requests, documents, and people should be present in the immediate vicinity of the NPC.

Utilities

The NPC will be a major user of power, water, and sanitation utility services. The preferred NPC site must have the capacity to meet additional demands for utility service brought about during the period of NPC growth and must have adequate reserve capacities to meet overall peak requirements. The optimum location will have dependable and alternative sources of power for supplying the required energy for lighting, heating, cooling, and driving the processing and production equipment. Currently, the cost of energy is a major factor in determining the cost of products and services. Consequently, low electric power rates will be helpful in stabilizing NPC processing fees. However, variations in demand during peak hours and inadequate reserve capacities cause fluctuations in electrical power, brownouts and, on occasion, complete blackouts. An uninterruptable power source should be considered at an early stage. Such a system will provide a filter for power surges and a limited capacity to maintain systems in a blackout situation until they can be shut down in an orderly manner.

Although modest water consumption is anticipated, the NPC should be located in an area that will provide an adequate and dependable supply. For NPC purposes, water suitable for drinking and food preparation will be necessary, as will water supplies for other functions such as photographic laboratory facilities, the heating and cooling system, removal of sewage, and fire protection.

Adequate sanitation facilities and capacities must be available for the removal and disposal of sewage, garbage, and other rubbish. Since large quantities of paper will be discarded, the NPC should contract with a salvage firm to remove this material for recycling.

Human Resources

The NPC will require the services of skilled technicians and professionals as well as less skilled personnel. There should be an available pool of reliable labor at any site selected for the NPC. It may be critical to be able to hire part-time help to assist at peak load periods. It will also be helpful if there are those in the labor pool who are willing to work any one of three shifts. As use of the NPC rises, the way to use equipment to its fullest capacity will be to run three shifts. Thus the area selected should have other industries and businesses that routinely operate twenty-four hours per day. An additional element in the human resources area is the local cost of living and local wage rates. Should several sites have equal appeal on other issues, a careful examination of wage rates should be conducted in order to select the least expensive area.

Support Services

The NPC will employ a wide range of special equipment, which requires a locally available stock of parts and a local service capability. Though subscription agents are seldom close to the libraries they serve, it would be useful to have them in close proximity

to the NPC if some of the relationships between the NPC and the agents described in the chapter on technical processing are implemented. This is a case, however, where reliable communications can be substituted for geographic proximity.

Environmental Factors

Since the NPC collection will require carefully controlled environmental conditions, it will be useful to locate the NPC in such a way as to avoid extremes of temperature or humidity. Modest winter heating coupled with modest summer cooling would produce an acceptable compromise. Yet another environmental factor relates to the presence or absence of air pollution caused by proximity to heavy industry, a concentration of heavy highway traffic, and the like. The NPC should be located away from these pollution sources in order to lessen the burden on the air filtration system. Insofar as possible, the area around the NPC should be neatly landscaped in order to assure an attractive work environment for employees.

Capacity For Expansion

The actual site finally selected needs to provide space for the initial building and parking for a staff of up to 125. The NPC will grow, however, not only in terms of collection and staff, but possibly in relation to the type of material covered. Thus the site should have sufficient room to grow by a factor of three or four in order to provide for these contingencies. The growth to be allowed must cover not only building needs but staff needs as well in terms of parking and modest recreation support.

Characteristics of the Ideal Building

Once the NPC is approved and funded, an interim site will have to be selected. If the permanent site has already been chosen, the interim site (preferably clean warehouse space) should be located close at hand. This will prevent a disruptive major move once the NPC quarters are renovated/constructed and available for use.

The construction of the permanent NPC building will proceed only in the context of the NPC systems design itself. Consequently, the building will have to be modular and facilitate the work flows that are anticipated within the NPC.

Collection Areas

The NPC will have large collections of microfiche and, for the first decade or so, a collection of materials in hard copy that could easily approach 10,000,000 journal issues and possibly 500,000 bound volumes of periodicals. The microfiche collection could also approach 10,000,000 pieces. Each of these parts of the collection must be accommodated so as to provide easy and continuing access.

Machine Areas

The NPC will have several areas containing large arrays of equipment. The computer center will accommodate the front-end processor and all other related equipment except the terminals that are dispersed throughout the building. There will also be a special area for microfilming operations. Even the spaces for the technical processing

and request fulfillment (microfiche and paper photocopy) will be areas in which large numbers of machines will be located. Special care must be taken to assure a sufficient power supply and the availability of other utilities as required.

People Areas

Obviously, people will work in both the collection storage and machine areas. It will also be necessary to provide some strictly "people areas," such as a lunch/cafeteria area, restrooms, locker rooms, staff lounges, and administrative offices.

Internal Environment

The chapter on preservation describes the specific environmental conditions for the collections. Certain of the machine rooms may need special treatment as well. All other areas should be controlled to the locally accepted temperature and humidity levels. The entire building should be constructed in such a way as to retain the heating or cooling that is artificially supplied. In this day and age, it would be negligent not to recommend the exploration of solar energy supplemented by fossil fuel sources, for heating and cooling.

Vertical versus Horizontal Expansion

The fact that the NPC structure must be modular has been emphasized a number of times. The remaining question is: "Should modular expansion proceed vertically or horizontally?" The resolution of this problem will revolve around the availability and cost of the land upon which the NPC is to be built. Tower construction is to be

avoided principally because of the problems of vertical transport. However, a two-story building with substantial room to grow horizontally can provide the flexibility that would be required if additional types of material (e.g. books) were to be added to the access responsibilities of the NPC.

Space Required

The following space will be required to accommodate the functions of the NPC as they are projected for the first ten years.

1. Collection

Microfilm (in rotary power files)	12,000 sq. ft.	
Preduplicated material - inventory	3,000 sq. ft.	
Unbound-issue stacks	40,000 sq. ft.	
Compact storage - 300,000 vols.	15,000 sq. ft.	
Regular stacks - 200,000 vols.	20,000 sq. ft.	
Subtotal		90,000 sq. ft.
2. Request fulfillment		15,000 sq. ft.
3. Shipping/receiving/supply storage		5,000 sq. ft.
4. Technical processing		10,000 sq. ft.
5. Computing staff and equipment		6,000 sq. ft.
6. Administration		4,000 sq. ft.
Total assignable		130,000 sq. ft.
Nonassignable space @ 25%		32,500 sq. ft.
Total space required for the NPC		162,500 sq. ft.

GOVERNANCE

Two basic questions need to be addressed in considering the form of governance for the National Periodicals Center:

1. What are the specifications and requirements that must be met if NPC goals and objectives are to be achieved?

2. What are the relationships between the NPC and other existing or projected library programs and what implications do these relationships have for the form of governance?

To explore these questions it is necessary to document the characteristics and requirements of governance systems in general and certain elements of governance unique to the NPC situation. There are, for example, certain characteristics common to most organizations charged with carrying out activites like those projected for the NPC.

1. The purpose of the organization must be established and carefully articulated, and those individuals who assume responsibility for the organization must subscribe to that purpose.

2. The governing body must be established on a credible base and in a form (legislation, charter, etc.) appropriate to the purpose. The membership, structure, and procedures of the body must also be designed to advance the purpose.

3. The governing agency must be able to oversee management performance by specifying objectives, assigning responsibility, and assessing results.

4. The governing body must establish the basis for financial support for the operation and assure continuity of funding at adequate levels and in appropriate ways.

5. The performance of the governing body must itself be susceptible to review by those it serves.

In addition, the projected NPC also has some special characteristics that will influence the form of governance and choice of individuals to participate in it.

1. Because the NPC links in new ways the collecting and distribution functions of libraries on the one hand with the distribution activities of at least some kinds of publishing on the other, the governing body must focus on carrying out a set of traditional functions in new ways. Its membership must be sufficiently influential to command the attention of interested and affected parties and must exert strong leadership in transforming existing methods into the new approaches that seem required if established objectives are to be effectively met.

2. Because quality and reliability of performance will directly affect NPC success, the governing body will have to exercise strong leadership and provide clear direction to administrative officers and will have to be heavily involved in monitoring systems operations.

3. Largely for economic and technological reasons, the processes of publication and distribution are in a state of flux. Reflecting this situation, the governing body will necessarily face many fundamental questions in a dynamic operating environment. Thus it

is essential that the body include individuals with the specialized knowledge required to address these kinds of issues.

4. There are fundamental links between the collecting and distributing activities of NPC and the bibliographic structure required to identify and locate titles and articles. The governing structure should reflect the fact that resource development, access procedures, and bibliographic system functions are interdependent.

These specifications suggest that a strong governing body is required, one capable of providing leadership in molding a dynamic and complex set of activities into a cohesive and effective service for libraries and their users. But these same specifications and the substance of the report itself underscore the fact that the NPC, while focused on supplying periodical literature, is also inseparably linked to the nation's bibliographic structure, the evolving library communications network, and the complex process of resource development and preservation. Thus governance capacities must not only respond to the NPC's own objectives but must also provide ties to other elements of a national library service.

Because of the inescapable need to link the bibliographic structure to resource development and access activities and because of the centrality of the Library of Congress to many national programs, it seems important to tie the operating mechanism for nationwide activities to the Library of Congress in a way that neither constrains that mechanism nor adversely affects the performance of LC in its service to Congress or in its other established obligations. Because the library structure of the country is composed of many discrete components, because of the complexity of library functions and the dispersion of library services, and because of the characteristics of information itself, it is inconceivable that there will or should be a formal hierarchical and prescriptive centralized agency charged with operating a national library system. Instead, that system is likely to be a composite of many activities carried on in many places, a de facto rather than a de jure enterprise. It is essential, however, that all

parts operate against a common backdrop of basic services that are stable in quality and assured of continuity.

A two-level structure seems necessary in order to consolidate related efforts into an effective and economical nationwide library system and simultaneously to fulfill the specific requirements of the NPC. As a first step, appropriate efforts should be taken to establish a responsible mechanism for the coordination and operational direction of a limited number of primary national programs, including a periodicals center.

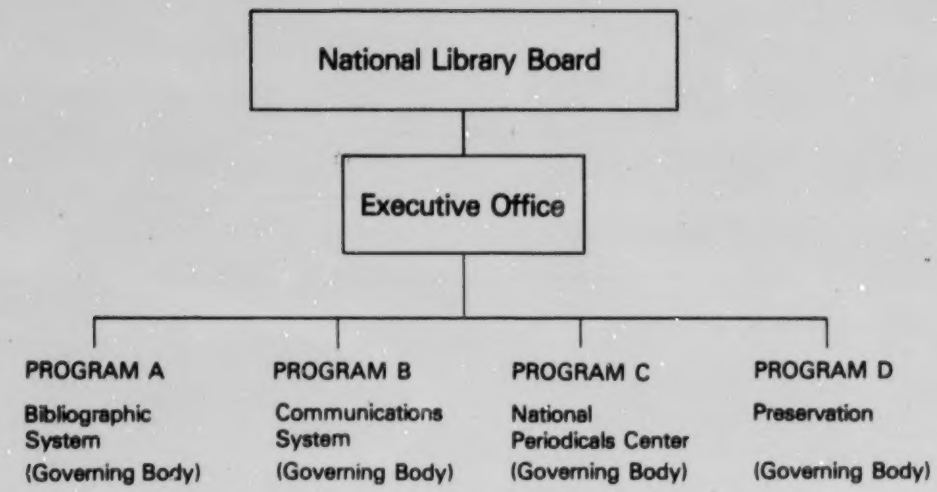
One possible approach for providing this base is the creation of a new organization with the authority and funds to establish and coordinate the needed programs. This organization would arrange for the delegation to appropriate organizations of direct responsibility for programs. The projected governing body of the NPC, would be responsible for accomplishing objectives set for it by this national library board and would itself look to that board for assistance in maintaining continuity of funding and assurance that bibliographic and communication services required in NPC operations would in fact be available and fully coordinated. The NPC governing body would operate in the context of a balanced national program. This two-level approach will allow for the tailoring of the governance structure of each system component to the requirements of that component and will still allow effective functional linking of related activities without creating a large and cumbersome superstructure.

A governing board has been described in general terms in program documents prepared by NCLIS, which is itself an important force in the evolution of the nation's libraries into a functioning system. NCLIS has fostered the exploration of relationships among all sectors influencing or concerned with library service, broadly defined, and has encouraged consideration of the needs of all users. The proposed national library board provides an uncomplicated but now essential operating capacity that can turn the results of past explorations into a functioning set of basic services for libraries. These services, in turn, will provide a backdrop against which libraries of all kinds can individually develop and operate in the context of their own priorities

and capabilities. The national programs envisioned as essential do not constrain individual libraries or library systems. Rather, they will provide those libraries with program and expenditure options they do not now have.

Because the concern is for the basic information transfer system of the country, the form of the organization of the "board" and its legal foundation will have to be established with care and with the same sensitivity to the subject of government presence that has shaped the character of the National Endowments for the Arts and Humanities and the National Academy of Sciences. Most important, the members of the board would be largely drawn from the ranks of scholars, scientists, university and public library trustees and officers, and public figures with demonstrated broad intellectual interests. Careful consideration must be given to the essential character of the board. If political influence or economic interests are determining factors in the selection process, they will erode the intent and ultimate credibility of the board. If the concept of such a board is valid, then the scholarly, academic, and library organizations should work in concert to find the appropriate way to bring it into being promptly.

The following schematic illustrates the structure of such a national board.



The NPC governing body should probably number 11-15 members and should include, ex officio, at least one member of the "national library board" and the chief executive of that board. NPC governing body appointments would be subject to review by the national board. Membership should include representatives of user groups and trustees or administrators of regional systems and individual libraries. With the objective of completing the communication circle, the chief executive officer for each program area, the director of the NPC, for example, might be designated an ex officio member of the "national library board."

The form and content of the charter of organization for the NPC will be governed in part by the manner in which it is established, but it is suggested that both charter and bylaws (along with any subsequent changes) be reviewed and approved by the national library board.

MANAGEMENT

This chapter proposes a plan of organization, management, and staffing for the National Periodicals Center. The recommendations are designed to cope with the different but equally important functions of running an efficient high-volume operation and of reaching sound professional decisions about the collections and services that should be available.

NPC Operating Characteristics

The management of the NPC will need to deal effectively with an operation considerably different from most user-oriented libraries and, in some respects, more comparable to a commercial assembly line manufacturing company. Specifically, NPC operations will be characterized by:

1. High volume. Within the first five years of filling requests the NPC may need to process 5,000,000 per year.

2. Price and time sensitivity. The NPC will be successful only to the extent that its costs to users and the speed of its service are competitive with other available sources of information.

3. Labor intensity. The NPC may have more than 200 staff members, mostly in semiskilled and skilled positions.

4. Visibility and accountability to many groups. The NPC will serve many and varied users and will respond to a variety of funding groups.

Overall Management Requirements

The NPC will require an organization, management, and staffing plan able to cope with the operating requirements listed above. The problem for the NPC will be to mobilize managerial, professional, and technical capabilities that are:

1. Performance and cost conscious. The NPC should be equipped to manage a high-volume processing operation geared to producing the greatest output per dollar in the shortest time possible.

2. Personnel oriented. The NPC will need to cope with a labor-intensive operation. This will require sophisticated personnel administration techniques, effective supervision, and performance incentives.

3. System oriented. The NPC will require constant application of integrated computer, communication, and reprographic technology to increase the timeliness, quality, and efficiency of operation.

4. Responsive to user library needs. The NPC will need to maintain effective relationships with users and referral libraries and to respond to changing ILL patterns.

5. Flexible. The NPC will require management processes and people geared to a changing environment, particularly during the initial, formative years.

It will be difficult to satisfy these requirements because people with different areas of expertise will need to work effectively as a team with a singleminded focus on the fundamental purpose of NPC: to provide quick, cost-conscious access to articles by users. This broad objective can be compromised if employees/managers are chosen simply for a particular subject or technical expertise and lack the broader perspective and flexibility needed to function well in an interdisciplinary setting. Similarly, few professional librarians are trained to deal with the demands of running a labor-intensive high-productivity operation. These problems must be recognized and given serious attention in the initial process of selecting senior management personnel.

Plan of Organization

The collection development and service functions that the NPC will need to perform have been described at length in other sections of this document. Major work activities have been described, and performance criteria are presented in this chapter. In addition various planning, financial, and other administrative and support functions need to be included in the NPC plan of organization. Collectively, they are as follows:

1. Leadership and management functions

   - Policy formulation
   - Planning and research, short- and long-term
   - Budgeting
   - Program development and evaluation
   - External relations
   - Legal affairs
   - Implementation, direction, coordination, and control

2. **Administrative and support functions**

   - Computer services and communications
   - Personnel
   - Fiscal control
   - Physical plant

3. **Resource development and preservation functions**

   - Collection development
   - Acquisitions
   - Bibliographic control
   - Physical preparation and preservation

4. **Access service functions**

   - Request processing
   - Daily user and referral library relations
   - User services

During the first few years the NPC will need to develop these functions in the general sequence listed above. Managerial, administrative, and collection development capabilities must exist before users can be served.

The administrative organization proposed for the NPC generally adheres to the functional groups listed above. The organization plan is presented on page 142; the functions and staffing of each unit are discussed individually in the following sections. In essence the plan of organization provides for:

1. Two top management positions, one for important external relationships and the other to attend to day-to-day operations. They are:

   a. A Director for overall policy and program development and external relations with the NPC governing body and key library and professional groups. The director will be supported by a Legal Affairs Office responsible for designing and executing official agreements with referral libraries, publishers, and funding groups and for general counsel in review of proposed policies and administrative regulations.

b. A Deputy Director for day-to-day implementation of plans and programs, and coordination of the administrative team. The deputy will be responsible for a Planning and Systems Development Office which will undertake planning and cost and performance analysis, as well as, initially, the design and implementation of the NPC systems.

2. Two service oriented high-volume units:

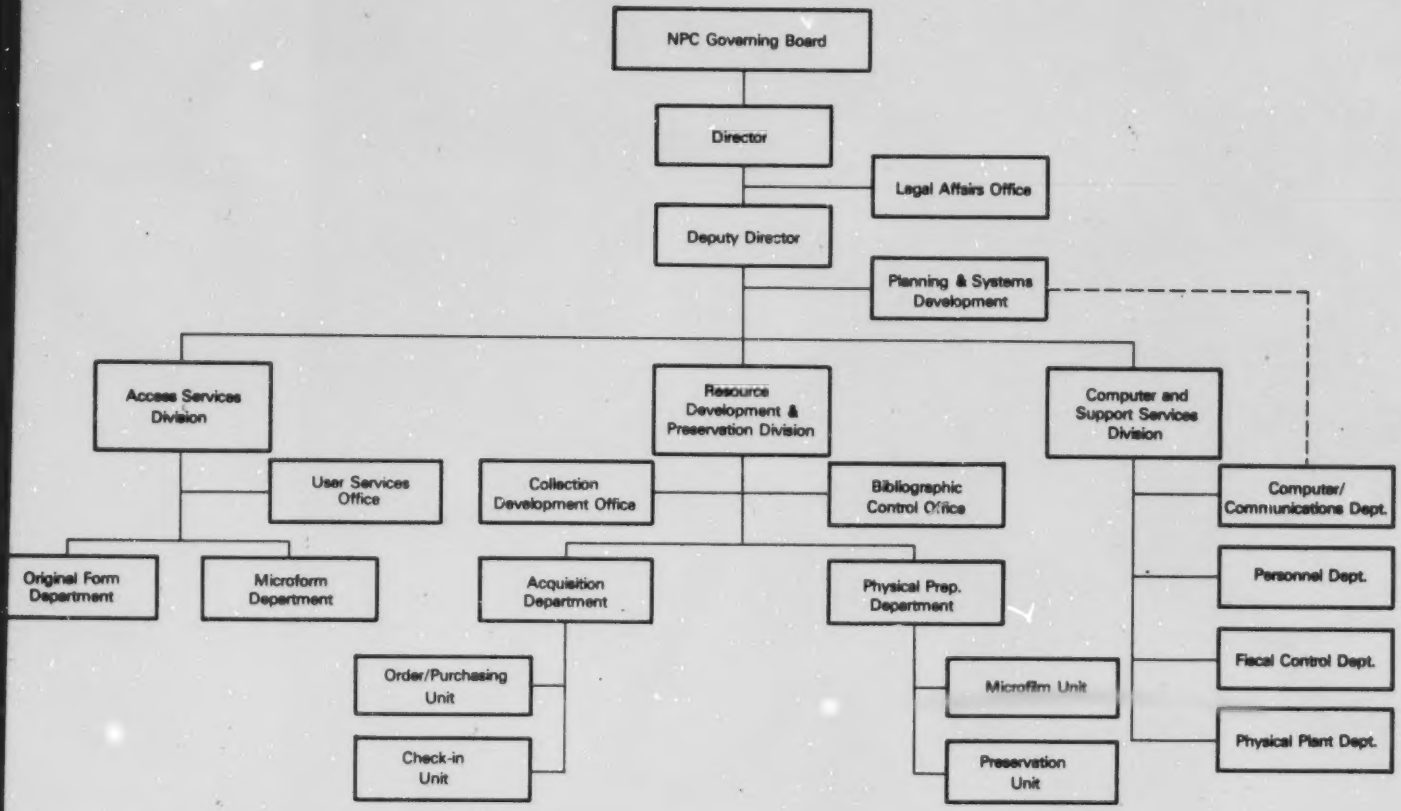
   a. Resource Development and Preservation Division, devoted to acquiring and processing the periodical titles the NPC will need to satisfy user requests and to preserve these materials for long-term use.

   b. Access Services Division, devoted to filling user requests in the shortest time and at the lowest cost possible.

3. An administrative and support unit, the Computer and Support Services Division, responsible for the array of data processing, fiscal, personnel, and auxiliary services required for the NPC to function effectively.

The duties and responsibilities, qualifications required, internal organization and staffing, key working relationships, and performance criteria associated with this organization plan are further described in the sections below.

National Periodicals Center
Organization Chart



NPC Director

The NPC director must provide overall leadership in four key areas:

1. Formulation of the NPC's developmental plan and strategy in terms of:

   a. Prospective and retrospective collection development policy (e.g., major inclusions and exclusions, use of referral libraries vs. NPC-owned collection, etc.).

   b. Program structure (e.g., what services should be offered and to what groups, priorities for development, etc.).

   c. Nature of the NPC's relationship with publishers, libraries, networks and consortia, and governmental and funding bodies.

2. Selection of and leadership to the top management team in terms of:

   a. The qualities and qualifications of the deputy and associate directors.

   b. Establishing priorities for the efforts of the deputy and associate directors.

   c. Monitoring and evaluating the performance of the deputy.

3. Development and maintenance of the NPC's official relationship with external organizations including:

   a. Publishers and related trade and commercial associations.

   b. The Library of Congress and other referral libraries.

   c. Library networks (e.g., NYSILL) and consortia.

   d. The Association of Research Libraries and other professional groups.

   e. Congressional bodies and federal and state agencies.

   f. Governmental agencies, foundations, corporations, and other funding sources.

4. Professional leadership and support to the governing body of the NPC in terms of:

   a. Long-range planning and policy recommendations.

   b. Staff support to facilitate meaningful board and committee participation and decision making.

   c. Performance and accountability reports.

The internal organization and staffing of the Office of the Director should include six professional and support staff. In addition to the director there should be:

1. A senior executive secretary to the director.

2. An administrative assistant for special projects, communications, and general correspondence supported by a secretary.

3. A Legal Affairs Office headed by a legal affairs officer (a lawyer) and supported by a law clerk for research and contract development and a secretary.

The key working relationships the director will need to maintain are those involving external groups, the governing body, and the deputy.

Qualifications for the position of director include extensive managerial experience, preferably demonstrating the successful development of a new operating system. In addition, this person should have professional stature and leadership qualities, the ability and inclination to delegate authority, and effective interpersonal and social skills.

Performance criteria should be established by the governing body to evaluate the director's performance. These might include such items as clarity and persuasiveness of plans for NPC development, the ability to accomplish benchmark goals, and success in attracting funds and in establishing working agreements with referral libraries and publishers. Another important factor will be the degree to which the director's policy recommendations are adopted by the governing body.

The director will be responsible to the governing body and will serve at its pleasure.

Deputy Director

The primary responsibility held by the deputy director is the implementation of NPC plans, policies, and programs on a day-to-day basis. The initial three years will have to be devoted to designing, testing, and refining the internal organization, as well as staffing and developing the work methods necessary to establish the NPC's collection and to prepare for filling requests. The work of the deputy will be structured in four key areas:

1. Systems development and coordination. This will involve the assurance that:

   a. Work methods and processes are developed within the respective units in a consistent, integrated, and complementary fashion.

   b. Computerized and other highly technical applications are given priority for development, consistent with the objectives of providing quick and cost-conscious service.

2. Selection (with the director), direction, and oversight of the associate directors. This includes:

   a. Assuring that needed complementary skills are available and that the staff work together effectively.

   b. Establishing administrative goals for implementation, including work priorities.

   c. Developing consistent administrative rules and regulations.

   d. Resolving interunit differences.

3. Program evaluation activities to improve unit performance, such as:

   a. Developing with supervisory staff performance objectives and criteria for evaluation that cover their unit and personal goals.

b. Monitoring and assessing performance, e.g., using time-lapse studies of request fulfillment and transaction costs.

c. Conducting special studies and demonstration projects designed to improve performance.

4. Keeping the director informed of implementation progress and involving the director in all key decision making.

The internal organization of the Office of Deputy Director should include twelve professional and support staff. In addition to the deputy there should be:

1. An executive secretary.

2. The Planning and Systems Development Office, consisting of an associate director and two units.

   a. A Planning and Program Evaluation Unit, to assess ongoing performance and conduct special projects. The unit should consist of an operations research specialist, two professional research analysts, and a secretary.

   b. A Systems Development Unit, to design and implement computer and communications systems, which will eventually be operated by the Computer/Communications Department (see page 153) on a routine continuing basis. Initially this unit will require a systems analyst, two programmer analysts, a programmer (trainee), a communications specialist, and a communications programmer.

The key working relationships the deputy director will need to maintain will be with the director and associate directors, especially the associate director of Planning and Systems Development. The deputy should have authority over the associate directors who will report through the deputy to the director; the director's dealings with the associate directors, aside from being heavily involved in the initial selection, should always be through the deputy to avoid any confusion about lines of authority.

The qualifications of the deputy director should include extensive management experience, particularly in the operation of large-scale technical service operations. In addition the deputy should have a seasoned understanding of and experience with computer systems development and operation. This person should also have demonstrated program evaluation and operation analysis capabilities and be attuned to the potential benefits of using such analytic techniques. The most important qualifications of the person holding this position are a broad understanding of the interrelationships of various NPC functions, a knowledge of technological applications, and the ability to deal with the interpersonal aspects of coordinating the efforts of the various divisions.

The criteria used to evaluate the deputy director's performance should include the establishment of explicit goals and objectives for administrative and systems development. In addition the deputy should have established among the associate directors a clear understanding of their respective roles, and should have developed close working relationships with them. Other criteria are the deputy's use of meaningful methods for assessing performance and costs and the development and effective use of computer, reprographic, and other technologies to support NPC functions.

Resource Development and Preservation Division (RDPD)

The purpose of the Resource Development and Preservation Division is to acquire, process, and preserve the NPC collection. To carry out this function effectively will require an associate director to manage both professional activities associated with collection building and clerical activities associated with the ordering and processing of materials. Reporting to the associate director for RDPD will be four important units. The first two are staff support units headed by a manager who is a professional librarian. The units will include:

1. A Collection Development Office, which will be responsible for deciding what periodicals (current and back files) should be collected in what priority and in what form. The staff of this office will include three professional librarians and three support personnel.

2. A Bibliographic Control Office, which will be responsible for maintaining the bibliographic file of periodicals available direct from the NPC or through referral libraries. The file also will be used to generate the NPC finding tool and will include key title and other ISDS data augmented by corporate and personal names. The staff of this office will include one support person.

The second pair of units are high-volume processing units that will acquire and process materials. These units are:

3. An Acquisition Department, responsible for orders from the time an order is placed through the check-in process. The department will need to handle from 8,000 to 10,000 invoices for periodicals per year as well as all other NPC purchasing functions. The department should be headed by a manager with strong administrative and supervisory skills. The department would in turn be organized into:

   a. The Order/Purchasing Unit headed by a purchasing agent and responsible for maintaining the acquisition and vendor files, placing the orders and processing invoices for payment when the first issue is received. This unit would also be responsible for the purchase of all other NPC supplies, equipment, and services. Staff would also include three purchasing clerks and a secretary.

   b. A Check-in Unit, responsible for maintenance of the receiving file, checking in materials against the receiving record, monitoring the receiving file for possible claims, processing all issues received, and for routing material to microfilming or storage. The Check-in Unit will need to unwrap and process up to 400,000 issues per year, or approximately 1,600 items per day. The unit will deliver materials to Physical Preparation or to the Access Services Division for shelving as appropriate. The unit will need to function one shift per day under a supervisor and four receiving clerks.

4. The Physical Preparation Department, responsible for deacidification of original materials when required, and/or for microfilming to create an archival and two printing master copies. The department will be under a manager who will oversee the work of two specialized units:

   a. A Preservation Unit, responsible under a preservation supervisor for examination and treatment of materials and routing them for shelving and/or microfilming. The unit will work one shift with the supervisor and a technician.

   b. A Microfilming Unit, responsible for microfilming selected titles, preparing and filing records of the archival and printing master microfiche. This unit under the direction of a supervisor will need to microfilm from 500 to 700 issues per day, requiring two inspection specialists, five camera operators, two clerks, and one microfilming technician.

The key working relationships of the division will largely be among its own units although its efficiency will obviously depend upon various administrative and support functions. The pattern of organization suggests that separate units based on the relatively self-contained activities or work processes will facilitate performance monitoring and establish clear lines of accountability. The units also differentiate between professional activities and high-volume processing operations to achieve the benefits of having similar types of people and operations together.

The performance criteria that should be used to evaluate the RDP Division and its units are generally concrete and measurable. Some of these are listed below:

Unit	Criteria and Unit Measurement
RDP Division	. Total number of titles selected and ordered and issues received and processed per month and year.
	. Average cost per transaction.
	. Staff turnover per unit and by position category.

- Number of titles ordered, deferred, and rejected per full time equivalent (FTE) employee.

Bibliographic Control

- Number of file records augmented per FTE.
- Number of temporary records prepared; ISDS records used per FTE.
- Currency and accuracy of the finding tool.

Acquisition Dept.

- Number of titles ordered (back files and subscriptions) per FTE.
- Number of invoices processed.
- Cost per order processed.
- Transaction time from selection to receipt by unit and by type of material.
- Number of issues checked in and number routed for storage, preservation, or microfilming per FTE.
- Number of claims by cause (damage or failure to receive) and vendor per FTE.

Physical Preparation

- Number of pages/issues/volumes treated; % of total; total weight processed.
- Number of pages/issues microfilmed; % of total.
- Cost per transaction.

Access Services Division (ASD)

The Access Services Division will be responsible for establishing and maintaining good working relationships with user libraries and filling their requests as quickly and efficiently as possible. Above all other qualities, the associate director of this division must be performance oriented and have demonstrated strength in personnel training, supervision, and motivation techniques. The bulk of this

person's time is likely to be spent helping supervisory personnel assure that work processes are efficient and that staff productivity is high. Reporting to the associate director will be three units, an Office of User Services and two high-volume request processing units.

1. The User Services Office will be responsible for resolving problems identified during receipt, review, and processing of user requests and with maintaining surveillance of user deposit accounts and processing fees. The office should be staffed by a manager with good public relations skills and two support personnel.

2. The Original Form Request Fulfillment Department will be responsible for the initial shelving of materials, retrieving original format materials from shelves, making paper copies, labeling the copies for mailing, and returning materials to the shelves. The department could handle one-third or more of all requests to be filled from the NPC collection and employ over 70 processing clerks working three shifts, each shift under a supervisor.

3. The Microfilm Request Fulfillment Department will be responsible for the initial filing of fiche, retrieving microfiche from files, making paper copies (for about 65 percent of all requests) and fiche copies (about 10 percent of all requests), preparing copies for mailing, and returning master print copies to the files. The department may need as many as 70 processing clerks working three shifts, each shift under a supervisor.

The performance criteria that should be used to evaluate the Access Services Division will be designed to monitor how long it takes to fill requests and at what cost. Some criteria include:

Unit	Criteria and Unit Measurement
AS Division	. Number of orders filled per month, by type of transaction, per shift and per FTE.
	. Number of orders filled by issue, by title, and by type of library.

- Average time from receipt of request to mailing.
- Average cost per transaction.

User Services

- Number of requests rejected by reason.
- Number of requests received by title.
- Number of delinquent deposit accounts.
- Number of completed requests through the unit.

Original/Micro-Processing Units

- Average total processing time per shift and FTE.
- Number and percentage of requests filled by film or paper copies.
- Average cost per transaction by type.
- Number of legitimate requests unfilled by shift per FTE.
- Average number of transactions before special preservation, microfilming, or replacement steps are required.
- Staff turnover and attendance reports per shift.

Computer and Support Services Division (CSSD)

The Computer and Support Services Division will provide the administrative and technical support required for the other NPC divisions to function effectively and for the NPC to exercise proper fiduciary responsibilities. The CSSD will be responsible for computer services, personnel, fiscal control, and physical plant. The division will be headed by an associate director with a broad business services background, who is competent with financial and computer matters. As systems are developed and become routine, the associate director will become responsible for operating them efficiently. The amount of machine down time, the time required to fill vacancies, and the quality

of physical maintenance of the NPC facility will have a direct impact on overall NPC performance. This associate director's main job will be to assign meaningful priorities, develop back-up contingency plans in case of system failure, and instill a support orientation in the various units. Reporting to the associate director will be:

1. The Computer/Communications Department, responsible for ongoing operation and maintenance of the NPC's data-processing capabilities and programs and for communication links to the various systems and files. The department should be under a manager and contain two units:

   a. The Computer Operations Unit, responsible for maintenance and operation of the NPC's hardware and software on a full-time basis. This will include a variety of systems applications to support the files, personnel records, and fiscal operations of the NPC. The unit should be under a systems supervisor with three shifts operating around the clock, each staffed with a computer operator.

   b. A Communications Unit, responsible for maintaining and operating the NPC's telecommunications systems. The unit will include one communications specialist.

2. The Personnel Department, responsible for manpower planning, recruiting, training, career development, salary and wage administration, and ongoing personnel administration. The department will be under a manager experienced with the type of personnel problems faced by high volume semiskilled labor operations. Further, this person should have successfully demonstrated an ability to develop effective training and incentive programs to heighten staff productivity and morale. The department may need to handle a turnover rate of 20 percent or more per year and to administer the compensation and fringe benefit program for over 250 salaried and hourly wage employees. Under the manager will be a personnel administrator for recruiting and placement, an executive secretary, and two and one-half personnel clerks for maintaining fringe benefits, time cards, absence records, and files.

3. The Fiscal Services Department, responsible for accounting and bookkeeping, budget calculations, receiving and distributing funds, internal auditing, processing of purchase orders, and payroll. The department will be under a manager who has had experience as an accountant and who has managerial experience in a high-volume computerized operation. The department should have two units:

   a. An Accounting and Bookkeeping Unit, to maintain accounts for funds, receipts, and disbursements; to process authorized purchase orders and invoices for payment; and to make a regular report on budget status (expenditures and encumbrances). The unit should be headed by an accounting supervisor and be staffed with a head bookkeeper and one and a half accounting clerks. (The half-time accounting clerk and half-time personnel clerk might be the same individual.)

   b. A Payroll Unit, responsible for preparation and issuance of the monthly and biweekly payroll for the NPC and maintaining the records of employee participation in and entitlements under the NPC fringe benefit package. The unit should be headed by a payroll supervisor and supported by a half-time payroll clerk.

4. The Physical Plant Department, responsible for security, custodial and maintenance activities, inventory control, and purchase of supplies and equipment. The department should be under a manager with plant operation experience, supported by several units:

   a. A Chief of Security, responsible for fire safety, alarm systems, and general internal and ground security. Security services should be acquired by contract.

   b. A Storeroom/Inventory Supervisor, responsible for receiving and storing supplies and equipment, receiving and routing mail, and for maintaining a property inventory system. The supervisor would be supported by a storeroom clerk, a clerk typist, and a messenger.

   c. A Custodial Maintenance Department, responsible under a manager for daily cleaning and maintenance of facilities and for provision of special maintenance support. The manager will be supported by a custodial supervisor; three custodians for cleaning and general maintenance; a maintenance supervisor; one heating, ventilating, air conditioning (HVAC) mechanic;

and a groundskeeper. Open service contracts with outside service contractors should also be considered for these functions.

The performance criteria for the Computer and Support Services Division are many and varied. Some are listed below.

Unit	Criteria and Unit Measurement
CSS Division	. User evaluation of unit services by periodic sampling.
	. Time utilization of computer and down time.
	. Staff turnover, number of persons hired and and terminated by unit.
	. Accuracy and timeliness of fiscal reports.
	. Appearance and control of facilities and environment.
Computer/Communications Department	. Number and type of applications (e.g. jobs).
	. Percentage of computer time devoted to each job.
	. Minutes/hours of down time by month and shift.
	. Number of processing errors.
	. Cost (including personnel) for computer hours.
Personnel	. Number of employees by position, shift, race, and sex.
	. Turnover rate by position category per shift and unit.
	. Number of new hires and terminations by cause and by unit.
	. Number of training hours.
	. Number of promotions.
Fiscal Services	. Number of checks processed by account.
	. Transaction time.
Physical Plant	. Number of work orders by category.

- Backlog of work orders.
- Average time between work order to completion of work.
- Number of complaints.

This section has reviewed the proposed plan of administrative organization and staffing. The next section discusses priorities for the development of key management practices and how they should be carried out.

Management Systems

The management systems proposed here are designed to help managers and staff deal with the unique NPC operating characteristics reviewed earlier: high volume, price and time sensitivity, labor intensiveness, and accountability to many people. This section will consider the priorities and principles governing development of management systems, planning and budgeting, program evaluation, and external relations.

Management Systems: Priorities and Principles

For the NPC to function effectively the efforts of a variety of interests must mesh and be devoted to the same goal. During the developmental stages of the NPC the need for a collaborative team approach will be essential for the establishment of a strong sense of common purpose and for the creation of individual unit plans within the context of the NPC. In order to assure that the NPC will function effectively, several management principles should be followed:

1. Focus. Clear system-wide goals and plans must be developed on which individual functional and unit objectives can subsequently be based.

2. Complementary Effort. The director, the deputy director, and the associate directors should constitute a management team and formulate, review, and seek consensus on the master plan, the respective roles each will play, the interrelationships that will exist, and the potential conflicts that could emerge.

3. Incentives. Incentive awards and other techniques foster a sense of "ownership" in the NPC and pride in its performance and should be built into the operating plans and decisions at all levels.

4. Commitment to Goals. Providing quality service to the user is the quickest, least costly way possible for the NPC to establish a reputation for responsiveness and should be the pervasive theme communicated to personnel and reflected in the actions of line managers and supervisors throughout the NPC. Virtually no proposed plan or action should be approved unless it will contribute to the accomplishment of this fundamental goal.

5. Feedback. Managers and staff should have precise feedback on their performance. Comparative results of different operating approaches should be examined. Given clear performance goals and constructive feedback on achievement, considerable freedom should be given to supervisors and staff to innovate and experiment to achieve their goals.

6. Opportunity. Job enlargement and career progression opportunities should be built into the NPC in order to attract and retain quality staff. Lateral as well as upward mobility should be common in order to vary exposure to different jobs and to increase mutual understanding of the interdependence of apparently dissimilar jobs in terms of achieving overall NPC objectives.

The suggestions set forth in the following sections are designed to help the NPC implement these principles.

Planning and Budgeting

NPC planning and budgeting should have two key elements:

1. Goal-Oriented Planning - the articulation of goals and objectives the NPC has to accomplish, largely developed by top management and its governing body.

2. Implementation Planning - the articulation of specific programs and activities to implement or help achieve the targets set by the goal-oriented planning process. At first this should be done largely by line managers and their staffs with final review and action by top management.

Once operating plans are adopted the NPC should decentralize the budget process to emphasize the authority of department heads and managers. Units should be regarded as cost centers, and all costs attributable to activities overseen directly by the manager should be aggregated into a budget that this person would be expected to control. The manager's primary objective would be to find ways to increase cost effectiveness. Subject to prudent management review and approval practices, the manager also would be expected to exercise initiatives to improve performance. Demonstrated improvements would be given bonus points for discretionary awards to be made periodically during the year (see section on personnel administration).

The Department of Fiscal Services should make available at least monthly budget status reports for each unit. These reports should show both expenditures and encumbrance information. They should be accompanied by management reports indicating performance related information (see section on program evaluation) provided by the Planning and Systems Development Office.

Program Evaluation

Program evaluation should be a primary function of the deputy director and of the operations research specialist. Their job will be to:

1. Define, with the participation of division heads, the specific performance criteria to be used in quantitative and qualitative terms.

2. Design and implement objective methods of performance evaluation on a unit by unit basis with the emphasis on providing managers with useful feedback on results.

3. Maintain data on staffing patterns, attendance, tardiness, and productivity for each unit and shift and make these available widely to managers.

4. Interpret results for managers in terms of how they compare with other units, differences in staffing patterns, etc., that might account for variations or that tend to correlate with high cost effectiveness.

Considerable attention should be given to comparative performance throughout the NPC. Unit by unit and shift by shift comparisons should be posted regularly and recognition should be given to the best performance or most improved unit to help motivate employees to consistently strive for ways to improve. The NPC should periodically survey employee attitudes (e.g. job satisfaction) and provide these results to managers. Ways should be found to provide a standard basis for comparing different units, even though they are engaged in different activities.

Personnel Administration

The importance of sound personnel administration to the NPC's effectiveness cannot be exaggerated. Potential problems such as high turnover and absenteeism will be avoided by utilization of the most up-to-date personnel techniques geared to attracting, motivating, and retaining quality staff. Accordingly, the NPC will require a strong central personnel office that will:

1. Administer the NPC classification and compensation plan.

2. Plan for manpower requirements.

3. Identify source of, recruit, and screen qualified applicants for vacant positions.

4. Orient and train personnel to include training of supervisory staff in effective techniques of supervision.

5. Maintain personnel records and files.

6. Establish and monitor the implementation of effective personnel evaluation systems.

External Relations

Much attention will need to be given by the NPC to relations with various public, funding, and user groups. Initially, this burden should be born by the director as formal relationships and working agreements are negotiated with networks, users, and publishers.

In order for this function to be performed effectively, the director should work with one or two members of the NPC governing body to:

1. Identify the most important external groups with which the NPC may need to interact.

2. Determine how best to create and maintain these relations, using written materials and personal contacts.

3. Decide what annual and other general reports should be published by the NPC.

The Financial Plan

The NPC will represent a national resource that will require an ongoing subsidy so that important material can be acquired, preserved, and made available even in the face of modest demand for that material. However, the NPC should ultimately become financially self-supporting for routine operating costs by virtue of the fees charged and the high level of processing efficiency.

The capital, operating, and preservation costs associated with the first five years of NPC operation are presented below.

Elements of Expense

Three types of costs will be involved in the NPC's initial (start-up) and ongoing operation:

1. Capital costs, consisting of facility construction and first-time initial furnishing costs.

2. Operating costs, including all costs associated with acquiring, processing, and maintaining the collection and filling requests. Actually the cost of the collection will be considered a continuing capital cost. The communications costs have been estimated on a

per transaction basis. It is to be expected that reductions can be achieved once the communications system is operational.

3. Preservation costs, including only those costs associated with microfilming materials in fragile condition or with special characteristics (e.g. large size), and where microfilming is not operationally justified based on the volume of requests made.

Eventually, continued funding should be available to routinely microfilm all materials received at the NPC for purposes of preservation.

Income and Expense Projection

Exhibit 1 on page 163 presents the NPC's anticipated operating expenses and preservation costs for the first five years from initial planning to full scale operation (see the chapter on implementation). Exhibit 2 on page 164 compares the financial results assuming that (1) the NPC fills 500,000, 1,600,000 and 2,700,000 requests respectively during the first three years of request fulfillment and (2) that processing fees from $2.00 to $3.50 per transaction are charged.

EXHIBIT 1

NPC BUDGET: YEARS 1 - 5

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
1. OPERATIONS					
Personnel (incl. salaries & fringe benefits)	758,000	$1,403,000	$1,857,000	$2,272,000	$2,740,000
Supplies	35,000	80,000	84,000	89,000	95,000
Communications	20,000	200,000	375,000	1,200,000	1,725,000
Equipment (systems)	250,000 (1)	250,000	250,000	250,000	250,000
Insurance	5,000	10,000	10,600	11,000	12,000
Collection Development	2,095,000 (2)	2,095,000	2,095,000	2,095,000	2,095,000
Other equipment	300,000 (3)	300,000 (3)	300,000	380,000	425,000
Heat, lights & maintenance	35,000	37,000	39,400	42,000	44,000
Mail	-	-	77,000	232,000	428,000
Outside contractors	200,000	200,000	100,000	50,000	50,000
Contingencies	50,000	50,000	50,000	50,000	50,000
Subtotal	3,748,000	$4,625,000	$5,238,000	$6,671,000	$7,914,000
2. PRESERVATION					
Personnel (incl. salaries & fringe benefits)	-	-	$35,750	$71,500	$75,000
Supplies	-	$8,000	8,500	9,000	9,500
Equipment	-	200,000 (4)	150,000 (3)	-	-
Subtotal	-	$208,000	$194,250	$80,500	$84,500
3. CAPITAL					
Facilities	6,500,000	-			
Furnishing & equipment	-	$250,000			
Subtotal	6,500,000	$250,000			
TOTAL	$10,248,000	$5,083,000	$5,432,250	$6,751,500	$7,998,500

Notes for Exhibit 1

1/ $1 million for computer equipment, amortized over five years.
2/ Includes $375,000 per year for acquisition of backfiles. Acquisition costs averaged over five years.
3/ Includes one microfilm machine each year for three years.
4/ For morpholine processor and deacidification unit.

EXHIBIT 2 SUBSIDY REQUIREMENT PROJECTIONS FOR YEARS 1 - 5

Assuming Various Processing Fees
(In Thousands of Dollars)

	Year 1	Year 2	Year 3	Year 4	Year 5
Operating Expenses	$3,748	$4,833	$5,432	$6,751	$7,998

Processing Fee	Subsidy Required for Basic Operation				
$3.50	$3,748	$4,833	$3,682	$1,151	($1,452)*
$3.00	3,748	4,833	3,932	1,951	(102)*
$2.50	3,748	4,833	4,182	2,751	1,248
$2.00	3,748	4,833	4,432	3,551	2,598
Number of Requests	-	-	500,000	1,600,000	2,700,000

* Income over expenses would be used for additional preservation activities.

It is clear from Exhibits 1 and 2 that the costs of the NPC are not trivial. However, it is also clear from Exhibit 2 that given the present cost and demand estimates, a modest and eventually declining subsidy of no more than $3,000,000 from the fourth year on would provide funds to assure the microfilming of all titles received at the NPC.

Funds required in the first year are $3,750,000 plus construction funds of $6,500,000. Second-year costs are $4,850,000 plus $250,000 for furnishings and equipment for the NPC building. Third-year costs rise to $5,450,000 but approximately 500,000 requests are expected to be filled. At a processing fee of $3.00 per transaction, the third-year costs are offset by a $1,500,000 income item yielding a net cost of $3,950,000. Fourth-year costs reduced by an income item of $4,800,000 generated from 1,600,000 requests would be $1,925,000. However, at this stage a full subsidy of $3,000,000 is requested in order to assure the preservation of all materials received at the NPC.

In the fifth year, the $3,000,000 subsidy will not only provide for all preservation costs but should allow a reduction in the processing fees charged for access to the NPC. As the volume of filled requests mounts, the processing fee can be gradually reduced and, ultimately, so can the subsidy. A word of fiscal caution is in order. All of these projections are based upon <u>expected</u> demand. If for some reason demand fails to meet these targets, all estimates will have to be modified including that of the required subsidy.

IMPLEMENTATION PLAN

The completion of this document marks the true beginning of the efforts required to bring the National Periodicals Center into being. There are three separate activities that need to be pursued in the next stage.

First, the leadership in the library and academic communities needs to work with appropriate legislative offices to prepare legislation that would establish the governing structure and authorize funds for its first program, the NPC. The legislation must be sufficiently general and broad based in its intent so that technological and scientific advances do not make the authorizing legislation obsolete. The scholarly, educational, and library communities need to support this effort to acquire legislation not only to create the required agency but also to fund it at a level sufficient to assure success.

The second activity that needs to be undertaken with considerable vigor is a public relations effort on behalf of the concepts expressed in this document. The intent and means proposed in this plan must be explained and "sold" not only to the various library and publishing communities but also to ultimate users, including the academic

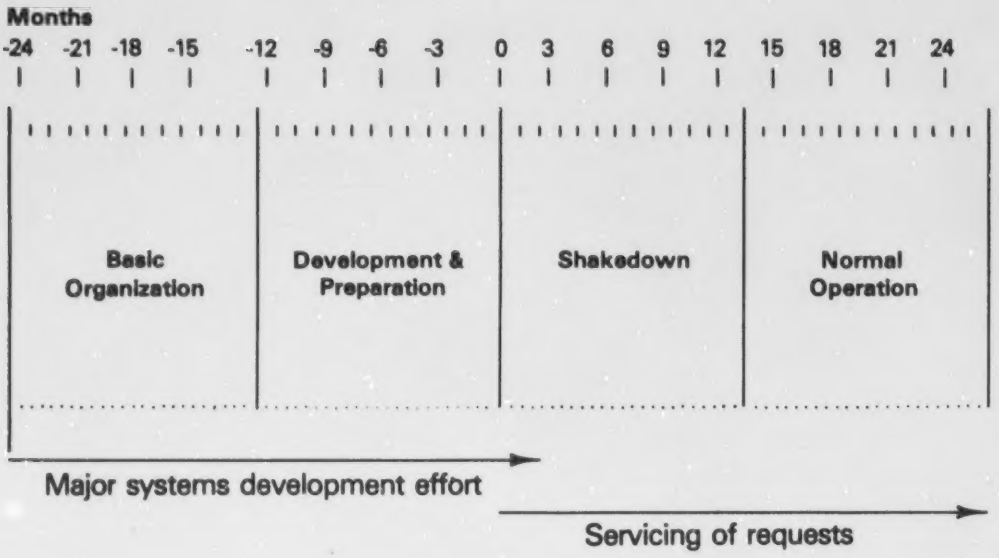
community, the business information user, the interested public, and the inquiring private scholar. This effort should include preparing descriptive material for publication, making public appearances to discuss the issues raised by this document, and collecting through conversation and correspondence the constructive criticism that will be offered by various individuals and groups. A single executive with secretarial support could handle this demanding task.

The third activity is a continued planning effort and stems from the preparation of the technical development plan itself. Areas that would prove useful in such an effort include selection of a basic collection, design and specifications for data-processing and communications systems, and the evaluation of existing computer systems. The British Library Lending Division is about to embark upon an analysis of its demand. They are willing to take into account the information needs of a developing NPC. Modest funding may be required to supplement the BLLD's planned analysis in order to yield appropriate data for NPC planning.

This continued planning effort could be conducted with as few as two full-time professional library managers who have secretarial support staff. All work that can be done prior to the authorization of an NPC will ease the pressure that will be created by the following implementation timetable. To await authorization before continuing further planning will hamper the development of the NPC. Continuation of the planning effort may be seen by Congress as a sign that the private foundations, the scholarly community, and the library world in general are serious about this enterprise.

Once the NPC receives authorization and funding, the process of bringing the service into being can begin. The following implementation plan is divided into four phases, each having a separate emphasis. In the chart below, time is measured in months counting forward and backward from the month the NPC opens its doors to request traffic. Following the chart is a description of the key activities of each phase.

Implementation Phases


Months
-24 -21 -18 -15 -12 -9 -6 -3 0 3 6 9 12 15 18 21 24
Basic Organization
Development & Preparation
Shakedown
Normal Operation
Major systems development effort
Servicing of requests

Basic Organization Phase (-24 to -13 months)

The NPC governing body must be established, and the director and deputy director of the NPC hired, in the early months of this phase. As soon as possible, consultants will be employed for critical areas of program development. During the first six months key managerial, planning, and development staff will be recruited. The selection of the periodical titles to be acquired must be accomplished and subscriptions placed by the end of this first year. Contracts for the development of computer systems (where needed) must be let as soon as the requirements can be defined. The processing systems to handle incoming material must be developed and tested by the end of this phase. The site must be selected and prepared.

Development and Preparation Phase (-12 to 0 months)

The NPC will begin to receive and process material during this phase. Any defects in the processing systems must be corrected during the early months of this period. The microfilming system must also be organized, staffed, and tested.

During the latter part of the phase the initial users who will participate in the shakedown period must be selected and trained. The computer-assisted request-processing system must be developed and prepared for full operation by the end of the period.

Shakedown Phase (1 - 12 months)

The initial users will be phased in as the NPC system and staff capacity allow. The NPC will adjust operating procedures and staffing levels to accommodate demand as it develops. An analysis of performance and fulfillment capacity will begin during the latter part of the phase.

Normal Operation Phase (12 months onward)

By the beginning of this phase, the basic systems and procedures will be well established. Refinements and adjustments to meet variation in demand will continue. An evaluation of the initial collection development and microfilming policies will take place after 18 to 24 months of operation, particularly in relation to demand.

The following is a more detailed discussion of the implementation plan as it relates to each organizational unit and the functions each will perform during the four phases.

Governing Body

After the NPC has been approved and funding received the first few members of the NPC governing body should be selected to serve as a management committee during the critical initial months. The committee's main purpose will be to recruit a director as quickly as possible. Working with the director, the committee will select consultants to expedite development in the areas of automation, communication, collection development, and legal services, while the director, with advice from the committee, will hire key management personnel. The management committee will have full authority during this critical period. By the end of the basic organization phase the remaining members of the governing body will have been selected.

Director and Deputy Director

As soon as the director is selected, a deputy director should be recruited and hired. During the basic organization phase both should be primarily concerned with the internal planning and development of the NPC. This includes the selection and hiring of staff for other key management positions and the establishment of operating policies and procedures.

During the development and preparation phase the director should work with the legal officer on agreements with publishers and referral libraries. The director will be heavily involved in promoting the NPC to both the library and publishing communities and will have to continue these activities during the shakedown phase.

The deputy director should concentrate on the internal technical development of the systems and procedures during the development and preparation phase and continue to refine these during the shakedown phase. The deputy director's principal concern must be NPC operations. It is conceivable, of course, that the roles of the director and the deputy director could be reversed depending on the relative strengths and dispositions of the two individuals.

Legal Affairs Office

As noted above, the initial legal work will be directed by consultants. As soon as possible in-house legal staff should be hired to assist the director in working out arrangements and agreements with the publishers and referral libraries. This should start by the middle of the basic organization phase (-18 months). During the development and preparation phase a standard agreement with referral libraries must be devised and reviewed by potential referral institutions. Legal assistance will undoubtedly be required well into the normal operation phase.

Planning and Systems Development Office

Since the initial task of the Planning and Systems Development Office will be to develop the required systems for the NPC, it is important that its personnel be hired as soon as possible. It should be fully staffed by the beginning of the development and preparation phase with key individuals hired as early as the middle of the basic organization phase.

As stated elsewhere, systems and/or subsystems will be either acquired if available or developed via contract. Where subsystems are developed via contracts, it will be necessary to prepare the required specifications, test the products, and integrate the various subsystems into the total NPC system. When the systems and procedures stabilize in the normal operation phase, the emphasis of the development office will switch to research and analysis of collection and demand. Planning and development, whether contracted out or done in-house, will be the responsibility of this office.

Access Services Division

Since the responsibility of the Access Services Division is to provide access and service to requesting libraries, it need not be fully staffed until the NPC is ready to receive requests. The associate director for access services should be hired by the end of the basic organization phase. This individual will plan the required procedures and acquire the equipment needed. In the last three months of the development and preparation phase (-3 to 0), the User Services Office should begin to process deposit accounts from the libraries to be allowed access during the first year. This office should also prepare and distribute the instruction manual at least one month before the shakedown phase begins.

A one-month testing period prior to entering the shakedown phase should be planned with one to three participating libraries, in order to test the communications and computer systems as well as the human systems within the NPC. This will require some staffing of the Original Form and Microform Departments, but at a very low level. The staffing of these two departments will begin a gradual but steady increase in clerical and technical positions during the shakedown phase in direct response to the increased load of requests.

Resource Development and Preservation Division

The Resource Development Office, which will be responsible for title selection, needs to be staffed early. As stated above, consultants may be used for initial selection. It is also possible that the NPC could contract for the selection of the first 36,000 titles. The contractor would provide a machine-readable file of titles from which orders could be generated. Whether this is done in-house or via contract, the work should be completed by the sixth month of the basic organization phase. This will allow vendor selection (dealer or direct order) and order placement by the ninth month of that phase. Such timing will ensure receipt of issues by the first month of the

development and preparation phase, thus giving the NPC a full year's holdings at the time it begins to receive requests. During the development and preparation phase the Resource Development Office will continue to select new titles for the NPC collection (both subscriptions and back files) in addition to integrating titles from the referral libraries into the inventory of NPC-controlled titles.

The Bibliographic Control Office needs to work closely with the Resource Development Office. Only a few staff members will be needed initially since records for the majority of the first 36,000 titles are likely to be in the ISDS/CONSER base file and can be used without further modification. As selection of the less common titles and the back files takes place in the development and preparation phase, the staffing of the Bibliographic Control Office will have to be increased. It is possible that in the early stages the Resource Development and Bibliographic Control Offices could share the same staff.

The Order/Purchasing Unit must be staffed and functioning no later than fifteen months before the NPC opens. Staffing and operation of this unit at an earlier stage will depend on such basic decisions as whether the majority of orders will be placed with subscription agencies or directly with the publishers and whether the initial ordering will be done contractually.

The Check-in Unit must be staffed thirteen months before opening day and must be operational one month later. The level of staffing will depend on how much material will be checked in at the NPC as opposed to being checked in by a contracting agency.

The Physical Preparation Department must initially be staffed for the development and preparation phase. The head of the department should be hired by month -12 to ensure time for planning and acquisition of equipment and supplies. Since subscriptions will start to arrive in month -12, the Microfilming Unit needs to be operational by then; however, the Preservation Unit will have a low volume of activity until the back files begin to arrive. Its head should be hired between month -12 to -9 so that quality control of the current stock is implemented, and equipment and supplies can be acquired.

Computer and Support Services Division

A small knowledgeable staff is needed during the basic organization and development and preparation phases for the Personnel, Fiscal Services, and Physical Plant Departments. Careful planning is needed so that the NPC can grow without difficulty from a small staff to a relatively large one.

Since the basic function of the Computer/Communications Department is the operation and maintenance of systems developed by or through the Planning and Systems Development Office, this section need not be fully staffed until those systems are nearly ready. Site preparation and equipment purchase (or rental) will be needed before this, but the Planning and Systems Development Office will have responsibility for these elements.

APPENDIX A

ESTIMATE OF REQUEST TRAFFIC

In order to estimate personnel and equipment requirements of the NPC during the first five operational years, it was necessary to develop estimates of the number of requests that would be received by the NPC during each year. While basic estimates were derived from previously published work, a number of additional factors, by their very nature difficult to assess accurately, had to be included. The difficulty and margin for error increase as the year of prediction becomes more distant. Following the table on the next page is a description of these additional factors for which allowances have been made.

The primary concern is to avoid overestimating the request traffic that might flow to the NPC. Given a modular design and a flexible system, unexpected increases in traffic can be accommodated, but an overestimate of demand would result in difficult budget problems.

PREDICTED NPC REQUEST TRAFFIC*

Year	Gross National Traffic	Predicted NPC Traffic	Daily NPC Traffic**	% of Gross National Traffic
1981	12,600,000	500,000	3,000	4%
1982	14,200,000	1,600,000	7,600	11%
1983	16,700,000	2,700,000	12,000	16%
1984	17,700,000	3,800,000	16,300	21%
1985	19,500,000	4,800,000	20,000	25%

* All figures are rounded.

** Estimate of average daily traffic at end of year.

Additional Factors

1. Gross National Traffic (GNT). The gross national traffic is based on the King report estimate of 6,000,000 transactions for 1976.(41) Estimates of the ILL growth rate from several sources varied from 16 percent to over 19 percent per year. This rate of growth cannot be sustained indefinitely. Therefore, a rate of 19 percent was used for the first year (1977), but the rate of growth was decreased by 1 percent for each year thereafter (e.g. 18 percent for 1978, 17 percent for 1979, etc.). There is the possibility that if the NPC is successful, the national ILL traffic rate will slow while request growth rate at the NPC will increase at an even greater rate for several years.

2. Medical Title Traffic. About 25 percent of the GNT consists of requests for medical titles. The entire 25 percent is deducted from the total GNT in these estimates even though a portion of this traffic may be deflected to the NPC. The collection development policy excludes clinical medicine titles because of the access provided to these materials through the National Library of Medicine.

3. Local, Regional, and Special Library Traffic. The NPC will not receive all requests for titles cited in its collection or available in the referral library system. Local fulfillment arrangements will persist because of favorable speed of access and/or cost. Regional (including state) systems will continue to receive requests for the more common titles. There will also continue to be special arrangements between individual libraries regardless of distance, speed, or cost. This factor in combination with the next factor greatly reduces the estimated request traffic directed to the NPC.

4. Break-in Factor. Until the library community -- and ILL librarians in particular -- become familiar with the NPC and are satisfied with its service and prices, a dampening effect will exist on demand. In other words, the library community will continue to use existing arrangements, or refrain from requesting service from the NPC, because the NPC will be an unknown factor. The nature of this effect will depend upon how the NPC is perceived by the library community and how the center performs with the early requests directed to it.

5. NPC Collection. Since requests will be initially limited to titles and volumes cited in the finding tool, the number of requests will be relatively small until the collection has the capacity to respond to a significant portion of the requests generated in the country. Given the log normal distribution curve and the decay function, discussed in the text on pages 48-49, this factor will continue to effect the level of requests received by the NPC for many years.

It is important, as mentioned earlier, not to overestimate NPC traffic. The further refinement of these estimates will have to await operating experience. Once the NPC is operational, traffic will have to

be carefully monitored in order to predict future demand. In some ways, the demand level is a marketing problem and the techniques used in that discipline should be employed by the NPC to assure a productive level of request activity. This is not to suggest that the NPC should attempt to divert a major portion of the gross national traffic but that the NPC should not suffer from being an unknown source of material.

APPENDIX B

COMMUNICATIONS

This appendix augments the chapter on communications and provides further details on the technical aspects of electronic communications. The following recommended approach deals specifically with the transfer of information related to the handling of requests addressed to the National Periodicals Center. No attempt has been made to accommodate administrative traffic or other forms of correspondence. It is intended that the communications channels discussed here will be dedicated to the processing of requests for periodical material. The primary objective of telecommunications in this instance is to transmit the requisite information to and from the NPC in a timely, reliable, and cost-effective manner. Therefore, all communications capabilities will be limited to state-of-the-art, off-the-shelf technology.

The topics to be covered here include the preparation of data for transmission, the transmitting and receiving equipment, the various means of communicating electronically with the NPC, and the processing of telecommunications data. The NPC's start-up capabilities in the area of communications will be discussed and some attention will be given to future capabilities, services, and experiments. Throughout the chapter reference will be made to the four principal elements of electronic communications for the NPC: 1) terminal equipment; 2) communications common carriers for long distance and local loop transmissions; 3) network nodes; and 4) the front-end processor (FEP) and the host processor (mainframe) located at the NPC.

Planning for Implementation

As mentioned in the chapter on communications, it is anticipated that most requests will be forwarded to the NPC through TTY or TTY-compatible equipment. There are several reasons for using this approach. First, since many libraries currently use or have access to teletypewriters, they will not have to purchase terminals in order to transmit requests. Second, libraries that must acquire TTY units will find them relatively easy to select and will require only modest supplies in addition to a maintenance contract. Third, since a teletypewriter resembles a typewriter, staff need minimal training in its operation, once format and input guidelines are learned. Finally, institutions have complete control over the costs associated with this transmission medium. Fixed monthly costs for line charges, lease or rental of basic equipment, and maintenance are fairly inexpensive. An institution can lower the variable costs through such mechanisms as batching multiple requests or using the telephone company's direct-dial evening and night rates.

These factors favor the user libraries, but certain benefits will accrue to the NPC as well. Teleprinter technology has evolved over a number of decades, and the communications techniques to accommodate it are straightforward and well known. Since the emphasis in this plan is

to use practical existing methods where possible, the use of TTY communications will serve as an inexpensive test leading to more sophisticated communications possibilities in the future. Ultimately, it is expected that user institutions will have communications access to the NPC via the bibliographic component of the emerging national library and information services network.

As stated in the communications chapter, the basic governing principle of NPC operations is source data automation (SDA). Where possible, source data should be captured in a machine-readable form at or as close to the point of origin as possible in order to provide optimum throughput at lowest cost. A modular approach to establishing NPC communications capabilities will permit future growth by accommodating increasing traffic while facilitating the expansion and upgrading of the mechanisms necessary to carry it. This will allow changes in the front-end processor to be independent of the mainframe. Accordingly, when changes in software and hardware are made in one module, there are less likely to be adverse results in others.

Message Text

The information that user libraries will transmit to the NPC will consist of messages that contain requests for periodical articles. Published guidelines will contain clear instructions concerning the format of the request. Users must adhere to the instructions or have their requests returned as invalid.

Although the text of a message may contain more than one request, each request will be treated as an entity during the process of request fulfillment. It is imperative, therefore, that for each separate request users provide information in each data field, even if the information is identical for all requests, since data will not be carried from one request to another. The data fields follow.

Field	Data Element Name	Representation	Characters
A.	SLIN	XXX-XXX-X	9
B.	Order number	XX-XXXXX	8
C.	ISSN	XXXX-XXXX	9
D.	Key title	Free format - alphanumeric	Not to exceed 70 characters
E.	Volume	Arabic numerals	Not to exceed 5 characters
F.	Issue	Alphanumeric	Not to exceed 7 characters
G.	Date	XXXX-_____	Not to exceed 15 characters
H.	Title of article	Free format - alphanumeric	First 30 characters
I.	Author	Surname of first author only	Maximum of 10 characters
J.	Pagination	Alphanumeric	As required
K.	Requested format (medium)	Alphabetic	1 character
L.	Remarks	Free format	Maximum of 150 alphanumeric characters
M.	Mailing address	Maximum of 4 lines of 30 characters	Maximum of 120 characters

A. SLIN. The Standard Library Identification Number (SLIN) is currently under development. It is a subset of the Standard Address Number. The SLIN will probably consist of six numeric characters plus a check digit. The use of hyphens in lieu of spaces is recommended to avoid transpositions. Nine characters, including hyphens, will be

required. The SLIN is a critical data element because it will serve as the authorization code or password that will be used to determine whether the originating institution has a current deposit account. Lacking a deposit account and therefore a SLIN, institutions will be denied access to the communications channels reserved for request processing. Under normal circumstances, the SLIN will automatically provide bill-to and ship-to information. A different SLIN will be required by each library or facility within an institution for direct document delivery service. Exceptions for delivery to a person's home or office will be indicated in field M, Mailing Address.

B. Order Number. The order number will help the requesting institution to maintain a chronological record of transactions. Among other things, it will be used to identify the particular request, when it was filled, and the amount debited against the deposit account. Order numbers will be assigned by the requesting institution. Each order number will begin with the last two digits of the current calendar year followed by a hyphen and consecutive assignment of any suitable mix of alphanumeric characters, e.g., 78-AA001, 78-1, 78-CTY27, etc. A maximum of 8 characters will satisfy requirements for this data element, including the three required characters, i.e., year and hyphen.

C. ISSN. The International Standard Serial Number will be used to uniquely identify the title of the periodical in question. The ISSN will be provided in the NPC finding tool for use by requesting institutions in all transactions with the NPC. Lacking an ISSN, the NPC will assign a temporary or provisional number for use until the assignment of an ISSN is made. The ISSN consists of seven numeric characters plus a check digit which may be alphabetic or numeric. The first four characters will be separated from the following four characters by a mandatory hyphen for a total of nine characters. This is a critical data field.

D. Key Title. The key title will be used by NPC staff to verify the item in hand with the order placed by the requesting institution. If series data are pertinent, they will be included in the remarks field. Key-title data will be provided in the NPC finding tool. Lacking a key title, the NPC will assign a provisional title. A maximum

of 70 alphanumeric characters will be sufficient to identify a particular title.

E. Volume. The volume number will be represented in Arabic numbers only. It will be used in conjunction with the ISSN to verify that the item is held by the NPC. These two data elements will also be used internally to route the request to the appropriate stack area in the NPC for request fulfillment. A maximum of five characters are required for this critical data element.

F. Issue. The issue number will be represented in Arabic numerals only. Other designations will be spelled out as they appear on the piece, e.g., summer. This data element will be used by NPC staff to verify the item in hand with the order placed by the requesting institution. A maximum of seven alphanumeric characters will be sufficient for this critical data element.

G. Date. The issue date will be represented in Arabic numerals only. Year, month, and day will be indicated in that order; year will always require four characters followed by a hyphen. A maximum of fifteen characters will be sufficient, including hyphens as separators, e.g., 1978-11-07 (November 7, 1978). The year of the periodical issue is a critical data element.

H. Article title. The title of the article requested will be represented by a maximum of the first 30 characters. It will be used in conjunction with pagination data to verify the item in hand prior to processing the request. Amplifying information will be provided in the remarks section if needed. For example, a requester may want a copy of an item beginning in the middle of one article and ending in the middle of the next article to replace the missing pages of a given issue.

I. Author. The first author of the article will be identified by the author's surname only. This information will assist NPC staff in verifying the item requested. A maximum of ten characters will be sufficient for the intended purpose.

J. Pagination. The pagination will identify the beginning and ending pages of the item requested. A hyphen will separate the two. Pagination implicitly represents the complete article. Amplifying data

will be provided in the remarks section if there are exceptions. This will assist the NPC in verifying the item requested. As many alphanumeric characters as required will be used to indicate pagination.

K. Format. A one-character code will be used to designate the requester's preference, e.g., paper photocopy, microfiche, etc. Format availability will be indicated in the NPC finding tool. Special instructions, such as photographic duplication in color of certain artwork, charts, etc., will be indicated in the remarks section.

L. Remarks. This section will allow the requester to add amplifying data as discussed above and other instructions such as preferred delivery service. Remarks should be brief and concise. Each entry is in free form and numerical designation should be used to distinguish different matters. A maximum of 150 characters should be sufficient to satisfy most requirements.

M. Other mailing address. This field will allow the requesting institution to indicate that the document is to be delivered to a location other than that prescribed by the SLIN. For example, patrons may find it advantageous for documents to be delivered to their homes or offices rather than to the library. This field will accommodate a maximum of four lines containing 30 alphanumeric characters per line -- a total of 120 characters. The zip code must be included for delivery.

Start-up Capabilities

As has been stated, libraries will be encouraged to use TWX, TELEX, and/or Dataphone services to send requests to the NPC. To minimize the time required to transmit and receive the data, only Automatic Send/Receive (ASR) terminals will be allowed to communicate with the front-end processor during the initial phases of operation. For TTY-compatible terminals, some form of auxiliary storage, such as paper tape, magnetic tape, cartridge, disk, etc., will be required for two reasons. First, by preparing and batching the data off-line, the terminal operator can exercise better quality control and thus reduce

the error rate. Accuracy is particularly important in the case of the critical data elements identified on pages 184-87. Second, buffered messages can be transmitted at a higher rate of speed than can operator-keyed data. This will also lower transmission costs and require fewer channels at the receiving end.

It is anticipated that most user and referral libraries will have TTY Model 33 or 35 ASR terminals. These are the most popular asynchronous terminal devices in use today and have become the de facto standard for teletypewriter applications. Both have a four-row typewriter keyboard and both are rated at 100 words per minute.

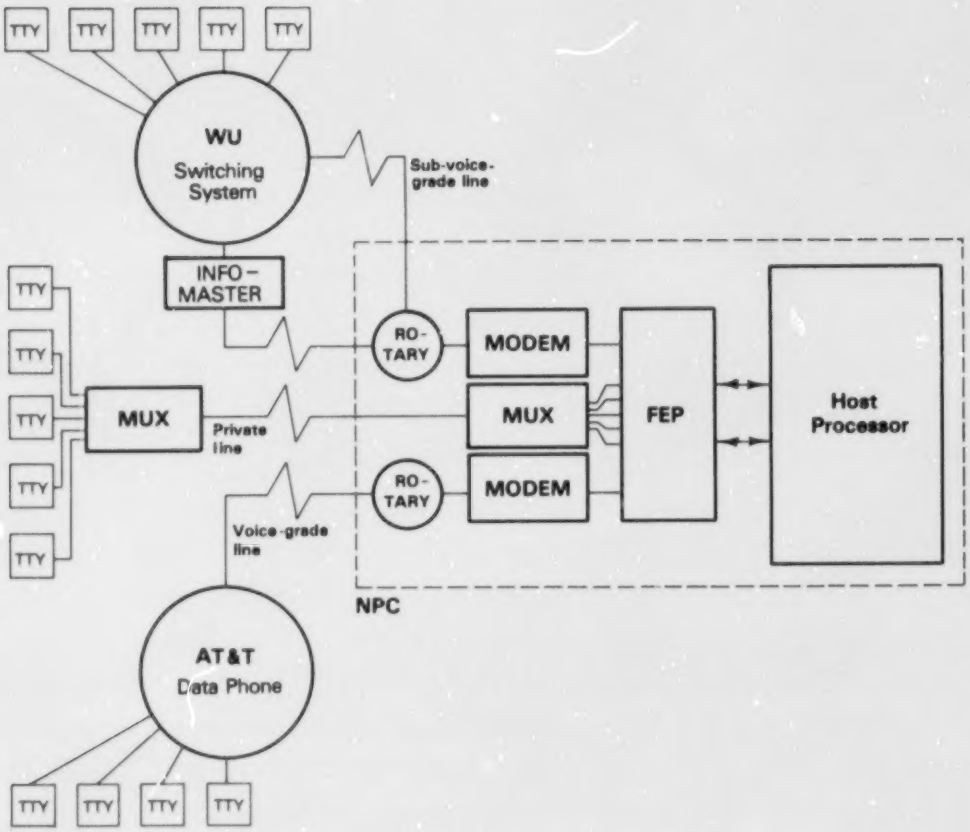
It is expected that demand may reach 487,500 requests during the first year of operation. Of that total, 112,500 requests will be received in the first six months, and 375,000 requests will be received during the next six months. The peak incoming load is estimated at 900 requests per day for the first six months and at 3,000 requests per day during the next six months. It is assumed that up to 95 percent of all requests will be received in machine-readable form via the common carriers and up to 5 percent of the requests will be retransmitted by the NPC to referral libraries. Assuming that a typical request will contain less than 500 characters including header and trailer data, the average duration of an incoming message is one minute including the time required for acknowledgment of receipt and line disconnect. For messages composed of multiple requests, it is assumed that each request will be reduced by about 20 percent to 400 characters or less.

For planning purposes, therefore, an average of one minute per message (the conservative estimate above) is used. During the first six months this means 180 messages will be transmitted during the peak hour of a normal workday if common carrier experience is valid (the peak hour generally results in 15 to 20 percent of the total daily transmission load). In other words, the NPC can anticipate requests arriving at a rate of three per minute during the first six months. In the following six months, 600 requests, or 10 per minute, will be received during the peak hour.

A communications network configuration that will serve the NPC and its users is illustrated in Figure 1.

Figure 1

NPC Electronic Communications



A user library equipped with a TTY or TTY-compatible ASR terminal will dial up the appropriate NPC number through the carrier. Provided that all channels in the NPC rotary unit are not busy, the transmission will proceed via the MODEM (modulator-demodulator) to the front-end processor. The FEP's primary function is to relieve the host processor of tasks that are singularly related to communications and protocols such as recognition of transmission speed and character coding, code conversion, error detection and correction, concentration of multiple communications input/output channels, buffering, and the recording of certain communications statistics. In addition to these communications control and management tasks, the FEP will verify the user library's identification and deposit account status, validate the existence in the NPC of the item requested, acknowledge receipt of the message and/or notify the requesting library of any errors that require retransmission, strip the message of unnecessary data, send the information to the host processor, and reroute the information internally for NPC processing or retransmit the request to a referral library for fulfillment.

Possible Near-Term Improvements

Attention must be given to incorporating modest capabilities for enhanced communications access that will be required during the latter phases of the first year of operation. Two possible alternatives for near-term improvements are also illustrated in Figure 1 on page 189.

The first improvement is based on a common carrier capability that provides each subscriber with access to a store-and-forward message switching system. In this example, the service is provided by Western Union and is called INFOMASTER. INFOMASTER or a similar service has two principal advantages for the user libraries. First, it eliminates the need for an operator to be present at the terminal when users are trying to establish communications with the NPC. This is particularly advantageous during peak hours when all circuits may be busy. Second, it will allow user libraries to transmit their requests to the NPC via the switching system with a Keyboard Send/Receive (KSR) TTY. From the

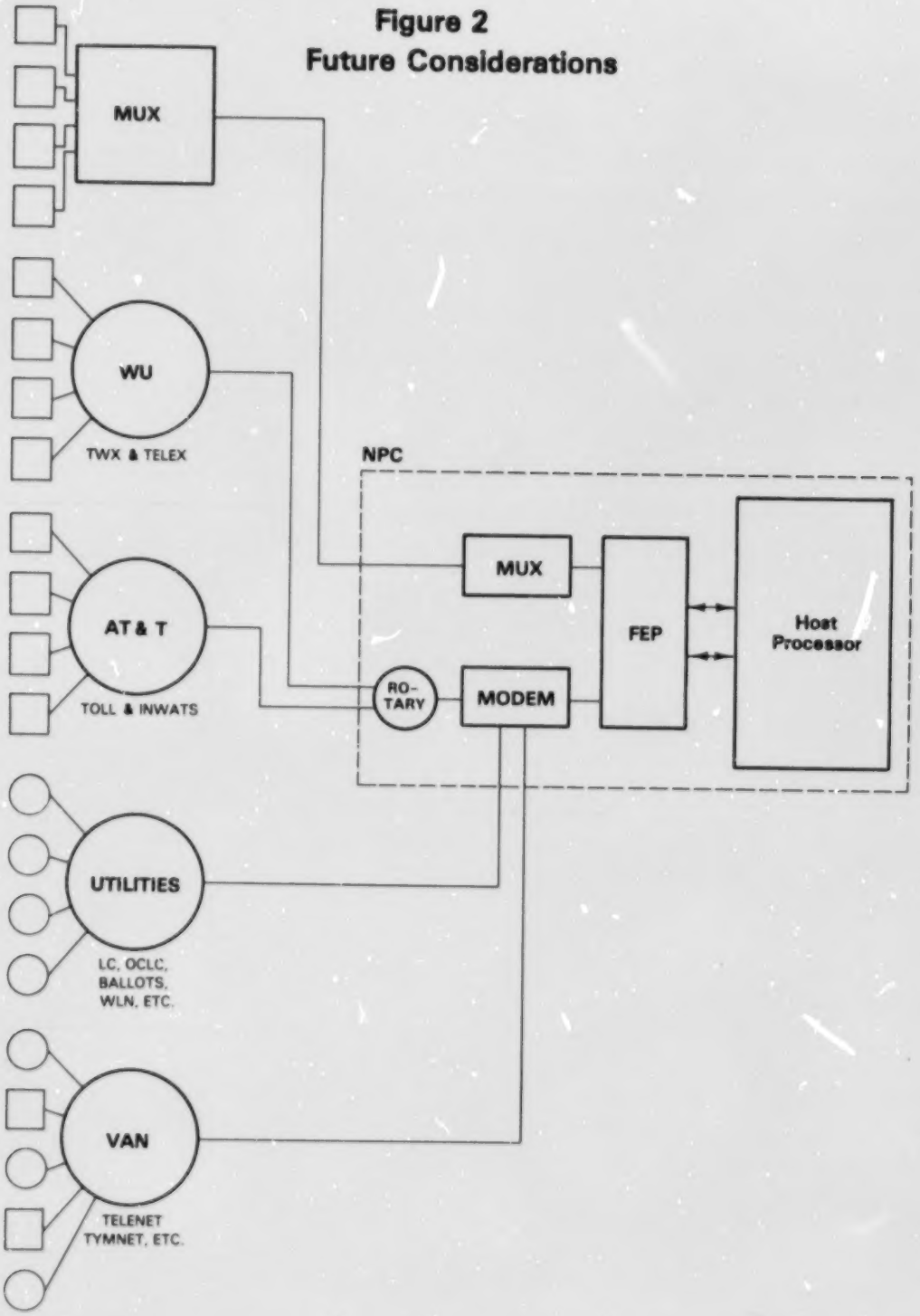
NPC's view, it will allow a higher data transfer rate and will make certain characteristics, such as TWX/TELEX code conversion, speed variances, manual keyboarding, etc., transparent.

The second possible improvement will depend on traffic analysis and experience. Where feasible, clusters of geographically related terminals, each of which has access to a low-speed line, can be brought together by a multiplexor (MUX) so that the individual bit-streams are combined and transmitted at a higher rate over a single line. In effect, the multiplexor becomes a remote concentrator that provides a lower communication cost through the reduction of individual long-distance line requirements. At the receiving end, the transmission is unpacked and the messages are received as though arriving via their separate channels. In addition to lower line costs, the number of rotary channels can be reduced and used more effectively.

Expanded Communications Capabilities

Following the gradual introduction of approximately 600 libraries during the first three phases of the implementation period, the addition of 500 to 1000 more libraries during the fourth and final phase of implementation may result in a major increase in the communications load. It is presumed that the FEP will have the capacity, or will have been upgraded, to meet the increased demand. Figure 2 illustrates some of the communications network design considerations that will be necessary during the final implementation phase.

Figure 2
Future Considerations



It is anticipated that demand for the next six months following the first year of operation will rise to 700,000 requests with an estimated daily peak load of 5,600 requests, or almost twice that of the anticipated peak during the first twelve months. If not already available, INWATS may offer a cost-effective alternative to individual toll calls by user libraries. The number of access lines and the type of service will be determined by an analysis of traffic density. Private leased lines for dedicated point-to-point communications between the NPC and the bibliographic utilities would allow user institutions to transmit requests via their existing terminal equipment, thus eliminating the costs of toll calls and possibly replacing the TTY terminal. Value Added Networks (VANs) are appealing not only because of the cost alternatives that these carriers offer but also because they provide communications data-processing services beyond normal transmission requirements. In summary, private leased lines and VANs offer potential cost savings, higher data transfer rates, and attractive communications support services. In year two of NPC operations, it is expected that user libraries will have access to the NPC via a mix of synchronous and asynchronous terminals, digital and analog communications lines with varying bandwidths and data transfer rates, and public and private (leased) lines.

Internal Communications

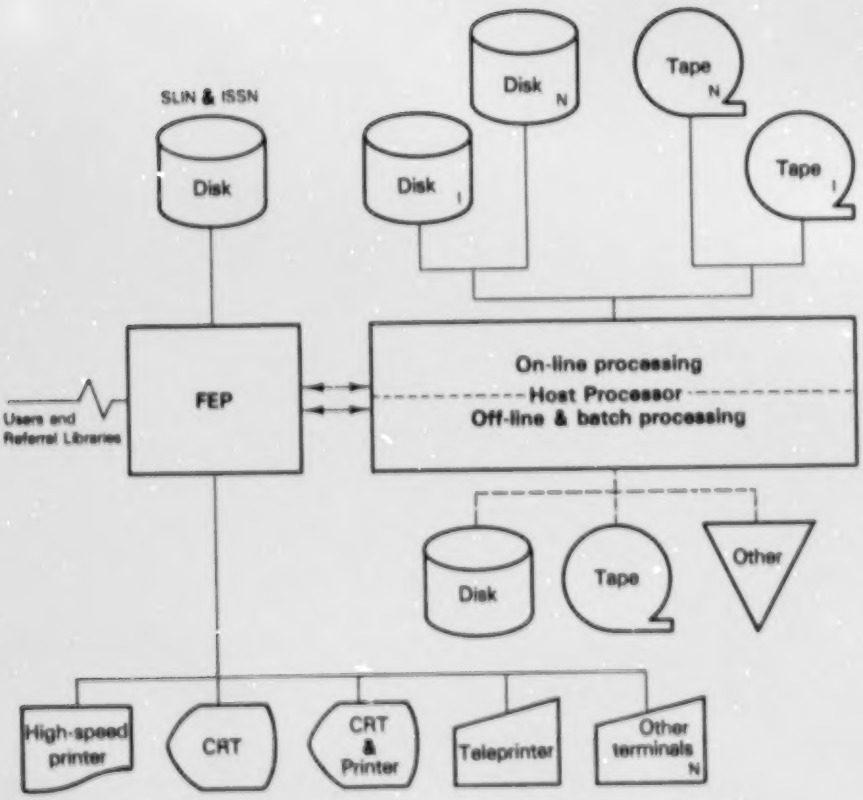
The aspects of electronic communications described so far have been concerned with external traffic, i.e., incoming and outgoing messages. Internal communications, specifically, transactions between the host processor and the outgoing communications lines and/or the terminal devices that may be used throughout the NPC are also important.

As stated earlier, the FEP's primary function is to relieve the host processor of tasks that are related to communications techniques and protocols and other minor processing functions in order to make more cost-effective use of the host processor. Obviously, the manner in which these tasks are handled is dependent on the make, model, and size of the front-end processor and the host processor. Until hardware is selected, an optimum configuration of equipment is assumed regardless of whether the tasks are performed by the FEP or by another piece of

equipment. Figure 3 illustrates the proposed optimum configuration. Internal communications for distances in excess of 50 feet generally require the use of a device called a line extender, line driver, or limited distance data set in order to assure the arrival of digital data signals in good condition. Many such line extenders are on the market. The correct ones to use can be specified once the physical dimensions of the NPC and its possible expansion have been ascertained and the terminal equipment types and operating speeds established.

Figure 3

Internal Communications Configuration



FEP Characteristics and Functions

Based on external and internal communications requirements, the following hardware/software functions have been identified for purposes of acquiring appropriate off-the-shelf equipment.

1. Verification and validation of user identification.

   Each request will be processed through an edit routine in the FEP to verify that the SLIN listed is that of an authorized user. The status of the requester's deposit account would also be checked by the same routine. This same edit routine would validate other data elements such as the ISSN in the request message.

2. Polling and dialing.

   Initially, users of TTY equipment will communicate with the NPC on a dial-up basis. As traffic volume increases, however, the NPC will need to monitor line availability and, as appropriate, make other access alternatives available. One possibility is the use of dedicated lines, which may prove cost and time effective. In this mode, users could prepare their messages and set their terminals (ASR units) to automatic send. When the NPC polls the unit, the prepared tape would be sent to the NPC. Polling will also be required for terminals located at the NPC for interactive processing. As communications capabilities are expanded, polling will be necessary for multidrop lines and possibly other nodes such as utilities and VANs.

3. Queuing and buffering.

   In a sense requesting libraries will employ queuing and buffering because of the store-and-forward function of the prepared tape and ASR equipment. The NPC's FEP will be structured to handle the queuing of message traffic and other transmissions in and out of the host processor. Overnight message traffic and other peak loads will also require a buffer capacity in the FEP.

4. Error checking, detection, and control.

As message traffic is received at the NPC, FEP procedures are required to ensure that data errors are detected and corrected. Line noise, distortion, and other aberrations in communications require character-by-character or pattern-checking routines. These routines are well known and reliable and would be readily available to the NPC. As other communication links are added to the NPC, it will be possible to use the additional support services of a common carrier, such as a value added network, which handles this kind of error detection and control.

5. Code conversion of multiple encoding schemes.

The FEP will require routines to translate codes utilized in electronic data transmission. Depending on the equipment used by senders, incoming messages may be in Baudot or ASCII code, while the host processor, terminals, and other allied equipment may be in EBCDIC, ASCII, or octal codes. The FEP has the task of converting codes in both directions.

6. Line and message switching.

Line and message switching is necessary for leveling or reducing contention for communications channels in both directions. The FEP will have routines that will switch message traffic between available lines and balance the flow over the appropriate network of communications channels.

7. Mixing of input channels to obtain multilevel transmission compatibilities.

User libraries will be sending data at varying rates of transmission speed. The FEP must have the capability of recognizing and handling these various speeds as well as the higher transmission rates between the FEP and the host processor and between the FEP and internal NPC terminals.

8. Mixing of input channels to accommodate analog and digital transmissions.

In the near future, use will be made of both analog and digital transmission facilities. These may include AT&T's Dataphone Digital Service (DDS) as well as services from TYMNET, TELENET, and private leased lines. The FEP should be capable of handling and processing all common types of input channels.

9. Message logging and statistical counts.

A record of requests received as well as of requests returned or fulfilled must be kept. As part of the information gathering routine, each message will be time stamped. This can be handled with a software program and adequate permanent memory.

10. Priority scheduling.

The number of ports needed for expeditious processing of user requests must be determined and priorities established for the efficient handling of tasks by the FEP. This priority scheduling can be built into software to handle this function.

11. Line concentration.

Line concentration, or multiplexing, refers to the use of a single communications line on a shared basis for multiple users with the same or differing rates of transmission.

12. Message reformatting.

The internal data-processing format will not be the same as the incoming request message. The outgoing messages including those to and from the referral libraries will also have a different format. To accommodate all these formats, the FEP will have routines that will rearrange data into formats to be processed by the host processor. Likewise, the FEP will take data and instructions from the host processor and create message formats that are suitable for transmission.

APPENDIX C

DATA-PROCESSING CONSIDERATIONS

This appendix augments material covered in the chapter on bibliographic control, technical processing, and systems development. Its purpose is to define in greater detail the characteristics of the processing functions and to suggest the logical relationships among the various sets of data that will support them. The intention here is not to be prescriptive but to set down a detailed approach as a point of departure for NPC managers.

File Relationships

The logical relationships among functions and files do not presume physical relationships. Similar data might be stored in different formats in different files depending on the modular characteristics of the hardware and software design. The ultimate design will, of course, depend on the developmental approach chosen by NPC systems designers who should conduct a comprehensive study of the availability of existing systems prior to making a decision.

Bibliographic File

The bibliographic file will contain the records of periodicals located either at the NPC or in a referral library for which the NPC will provide service. The file will also contain records for titles to which the NPC will not provide access. These will result from specific collection development decisions. Primary access to the bibliographic file will be provided by ISSN and key title. Eventually other access points would be added to include variant titles, corporate names, personal names, and uniform titles, although these latter two rarely occur in periodical literature. As mentioned earlier, the bibliographic file will be used to produce the NPC finding tool.

Receiving File

The receiving file, a subfile of the bibliographic file, will contain a separate record for each copy of each title held in the NPC inventory. The file will show detailed holdings of periodical issues expected and received, will control claim notification, and will indicate back issues wanted. It will also store instructions for routing and handling following receipt, such as storage location and special processing requirements (e.g. convert to microfilm), and special instructions for order fulfillment, such as payments due or price of individual issues.

Acquisition File

The acquisition file, a subfile of the bibliographic file, will include a separate record for each copy of each title currently received by or on order for the NPC whether the acquisition is by purchase, membership, exchange, gift, or through some special mechanism like the PL-480 program. For each item acquired, a source (vendor, publisher, society, institute) will be indicated. For purchased serials, a

distinction will be made between those requiring payment in advance of receipt (subscriptions, pro forma, etc.) and payment upon receipt (back files, single issues, annuals, etc.). A record of payments will be maintained for each item over the last three to five years. The file will contain an expected date of receipt of the next invoice in order to assure that payment is made before a subscription or membership is allowed to lapse.

Vendor File

The vendor file will be a name, address, and information file for all sources used to acquire serials for the NPC plus other administrative services and supplies. These sources include publishers, wholesalers, distributors, subscription agents, societies, institutes, etc. The file will use the proposed ANSI Standard Address Number (Z39, S/C30) known as SAN, which has recently been drafted. Foreign or nonbook trade sources can have a SAN-like number assigned by the NPC. In addition to the address, records for each vendor can contain information about personal contacts within the organization, contractual relationships with the NPC, discounts available, payment and invoicing peculiarities, and alternate sources of supply.

Accounts Payable File

The accounts payable file will be used to record all payments that have been or need to be made by the NPC. Although most of these payments will be for subscriptions or sales of issues, the file also would contain payment records for other services and supplies.

Sales File

The sales file will contain a record for each item supplied to a requesting library. Because the NPC will operate on the basis of deposit accounts, these records will be used to debit deposit accounts and to prepare periodic statements, which are sent to the libraries. The file will be an important repository of information on the use of the NPC and of particular titles and will provide key management data for planning.

Customer File

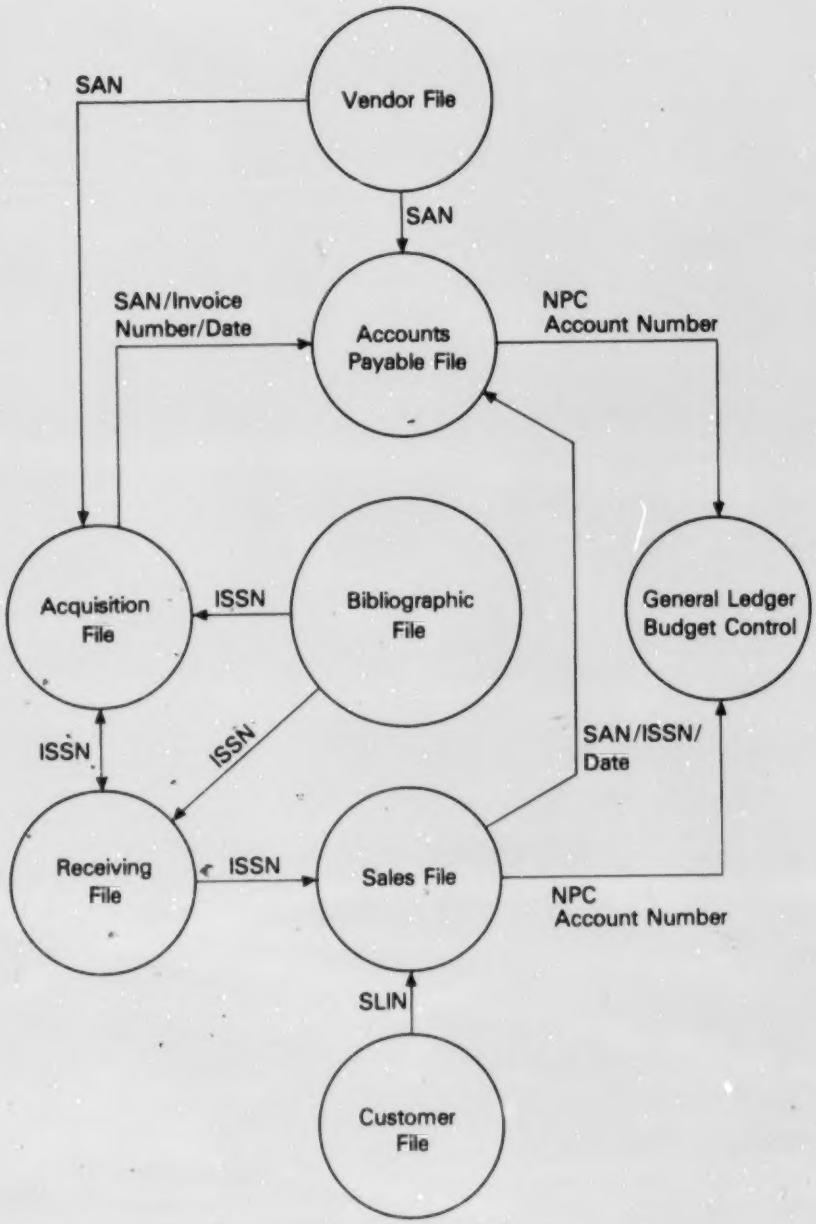
The customer file will contain the names and addresses of the libraries and other information centers that use and maintain an account with the NPC. The file will use the proposed Standard Library Identification Number (Z39, S/C45) known as SLIN, which is a subset of the Standard Address Number. Within the file there will be provision for the ship-to, bill-to mechanism that occurs frequently in order processing. Other information in this file will include special instructions for monthly statements, foreign currency considerations for libraries outside the U.S., sales taxes, TWX numbers, passwords for use of NPC files, personal contacts within libraries, etc. For management information purposes customers will be coded by type of institution, size of collection, subject specialty, etc.

General Ledger and Budget Control File

The general ledger and budget control file will use standard business practices to maintain financial control over the operations of the NPC.

The following schematic expresses the relationships between the files of the NPC and defines the nature of the links between them. The arrows indicate which files supply information to others. The acquisition file, for example, must have a link by ISSN to a bibliographic record in the bibliographic file and a link by SAN to a vendor record in the vendor file. Information from all three files -- acquisition, vendor, bibliographic -- will be required to produce, for example, a purchase order. Similarly, the accounts payable file must have input from the acquisition file for approved invoices that need to be paid and a link by SAN to the vendor file. When adding a record to the sales file, input is required from the receiving file and the customer file. The links between these files and the sales file are the ISSN and SLIN respectively.

File Relationship Schematic



Processing Functions

The chapter on systems development outlined the major issues facing NPC managers in developing an approach to systems design. Whatever the decision, the systems chosen must support the NPC's goals involving request load and response time. In the following discussion those activities that should be supported by on-line or batch technology are identified for each processing function. In particular, NPC systems designers must make considered choices as to which functions and related files must be on-line.

A clear distinction should be drawn between data which are on-line for inquiry only and data which are on-line for inquiry and update. Questions that must be resolved for each function are: Could this file be updated daily as a batch operation and be on-line for inquiry only? Would the delayed update adversely affect NPC performance? For example, as part of the request fulfillment function, each request will be checked as an on-line inquiry against the customer file to ensure that the current deposit account is active and has a positive balance. Thus, is it a requirement for a customer's deposit balance to be debited on-line for each request transaction throughout the day? Could not this activity be posted once a day as a batch job so that the customer file could be on-line for inquiry only? Systems development is less costly for files that are on-line for inquiry only with batch updates than for files that require on-line update.

Within the concept of on-line update are nuances that affect the complexity of systems development. Again, careful distinctions must be drawn. For example, less effort is required to develop an application that updates a file "in place," i.e. data are changed without affecting the length of the record, which allows the record to be returned to the storage location from which it was drawn. Further, less effort is required to update data that are not used as access points to a record. If an access point is changed, usually another record in an inverted file must also be changed.

The significant point is that systems designers must exercise great care not to overengineer NPC systems. The application is complex and the lead time for NPC systems development is short -- two years is almost not enough. Long delays in system implementation cannot be tolerated. Many of these issues may, of course, be settled for the NPC if it should select and adapt an existing on-line serials control system.

Bibliographic Function

File used: Bibliographic File

The purpose of the bibliographic function (located primarily in the Bibliographic Control Office) is to maintain the bibliographic file as the primary tool for access to NPC resources and to provide support for NPC operations: selecting, ordering, paying, receiving, claiming, filling requests, etc. A record must exist on the bibliographic file before any NPC operations can be performed on that record. Although component data elements of the bibliographic file could be maintained on-line in support of particular NPC operations (e.g. key-title access for the acquisition and receiving files), there is no requirement that the full bibliographic record be maintained on-line. A well-designed batch system can effectively meet NPC needs for the anticipated volume of transactions and file sizes (see Appendix D, page 237).

Systems with these bibliographic capabilities are available and should be acquired by the NPC. This system component should not be developed by NPC staff. Features of the transferred system should include:

1. Ability to accept as input and to produce as output MARC-structured records.

2. Ability to support internally MARC content designation for serials (commonly called MARC-S).

3. Capacity to input new records and modify existing records on the bibliographic file.

4. Capacity to conveniently edit individual records on the file and to perform general surveillance over the development of the file (e.g. the ability to call up and inspect all records with certain attributes).

5. Ability to explode and sort records by selected headings using sort keys suitable to the characteristics of bibliographic data.

6. Ability to format sorted entries into page displays using selected data elements from the records and to interface such displays with line printing and COM output devices.

As noted, NPC bibliographic records will be based on records produced by the International Serials Data System with temporary records created for serials not yet in the ISDS file. Arrangements will be made with the National Serials Data Program (NSDP) to expedite the creation of permanent records for these titles by prompt assignment of ISSNs and key titles. Through the development of a close working relationship with the NSDP and the use of the ISDS data base, the NPC will have to do little original keyboarding of bibliographic data, an important advantage when building the base file of 36,000 records.

The ISDS record contains the following data elements, all of which will be retained in the NPC record. In the lists below, items in parentheses represent ISDS terminology while other terms represent more common usage.

Fixed length data elements

Date entered on file
Center code
Publication status
Start date
End date
Country of publication
Frequency
Serial type (type of publication)
Alphabet of original title
Language of publication

Variable length data elements

CODEN
Classification numbers
ISSN
Key title
Abbreviated title
Variant title(s)
Imprint
Corporate name
Preceding entry link (former titles(s))
Succeeding entry link (successor title(s))
Other language edition of
Has other language edition(s)
Inset in or supplement to
Has inset or supplement
Related title(s)
Coverage by abstracting services

In addition to this list, the NPC will augment the record with the following data elements when they become readily available:

Fixed length data elements

Date of most recent change to record
Physical medium

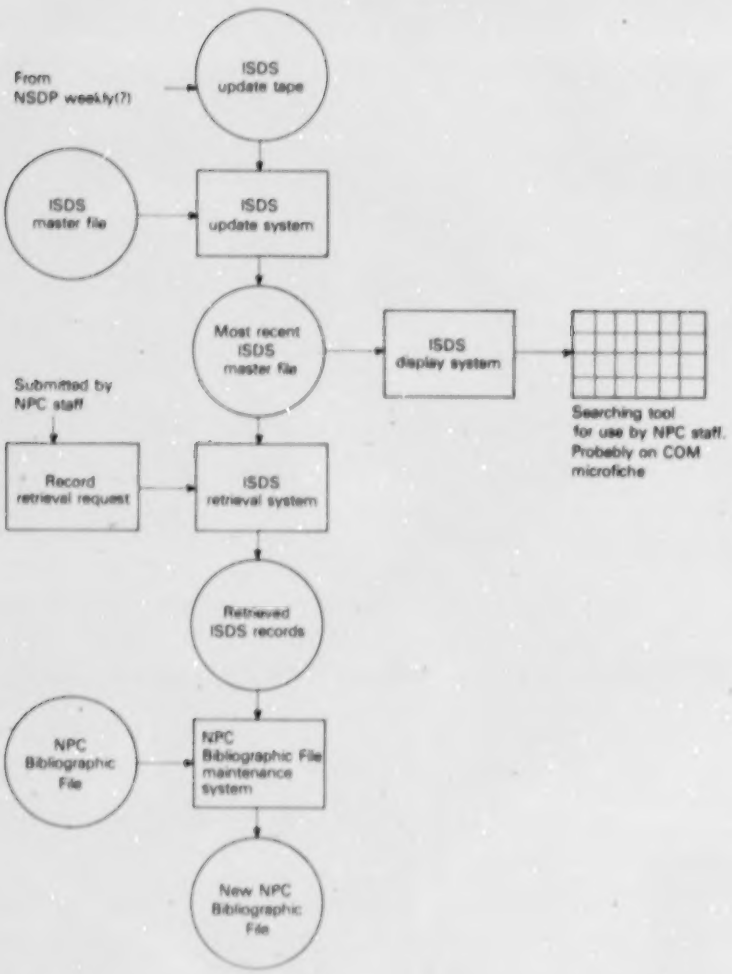
Variable length data elements

Other ISSN(s)
Library of Congress card number(s)
Beginning volume and date of publication
Edition statement
Personal names
Uniform titles
Subject classification (for collection development)
Collection development note(s)
Prices/fees
Summary holdings (consisting of)
Location - NPC or referral library
Holdings (complete volumes using ANSI Z39.40)
Form - if other than printed
Shelf or call number

Mechanisms for convenient and regular access to the ISDS data must be established. The most basic approach would be for the NPC itself to use batch retrieval on an ISDS tape file supplied and regularly updated

by the NSDP. Because the ISDS record has a MARC structure, software for the maintenance of the ISDS data base and for the retrieval of records from it for inclusion in the NPC bibliographic file would be relatively easy to acquire. This capability has already been developed by several libraries and vendors of bibliographic services. Such a batch system can be represented schematically as shown below.

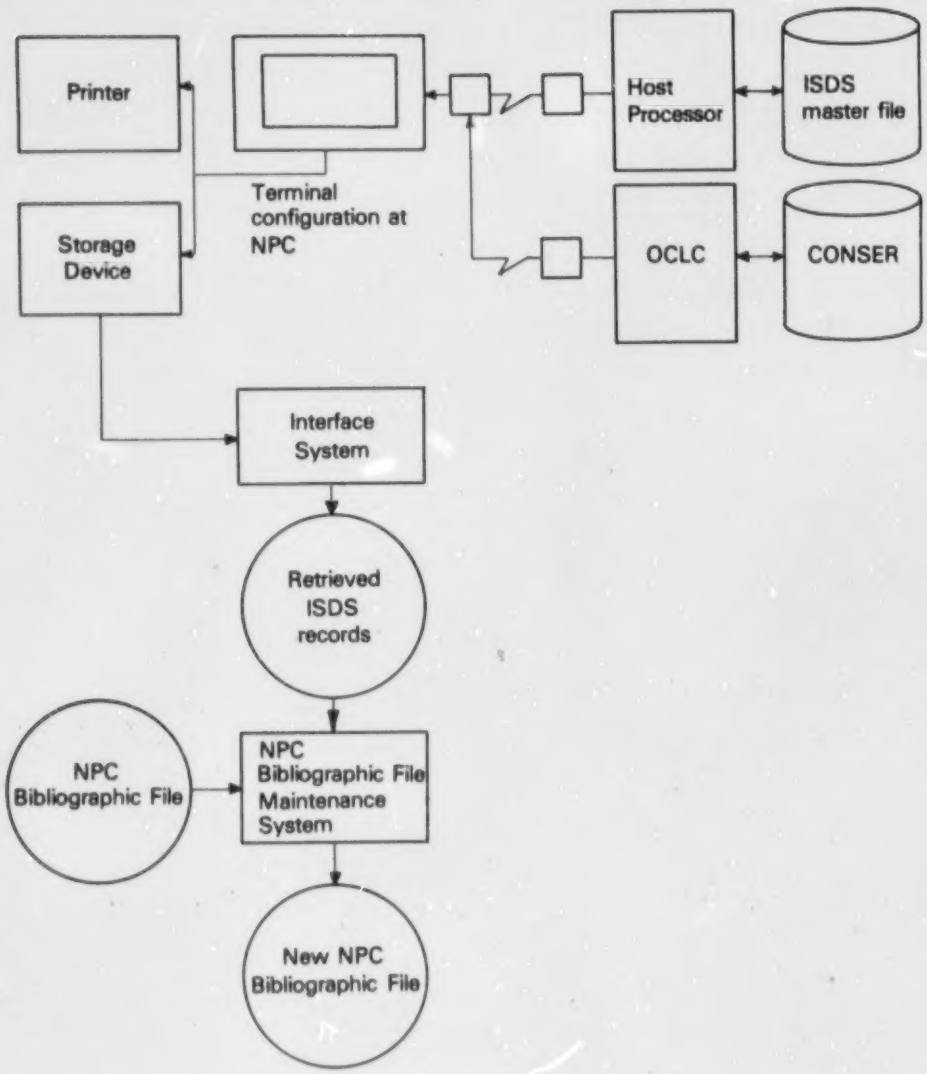
Batch Retrieval of ISDS Records


From NSDP weekly(?)
ISDS update tape
ISDS master file
ISDS update system
Most recent ISDS master file
ISDS display system
Searching tool for use by NPC staff. Probably on COM microfiche
Submitted by NPC staff
Record retrieval request
ISDS retrieval system
Retrieved ISDS records
NPC Bibliographic File
NPC Bibliographic File maintenance system
New NPC Bibliographic File

An alternate approach for access to ISDS data, and one that might be more efficient for the NPC, would require that the ISDS file be loaded on-line either at the Library of Congress or one of the bibliographic utilities. Then a communications link between the NPC and the data base could be established using a TTY-compatible, asynchronous terminal. Except for the creation of the NPC bibliographic file, the anticipated volume from the NPC (20 to 40 searches per day) would not warrant a leased line. A single terminal including a printer and a tape or diskette storage device would be sufficient. NPC staff could then dial a connection to the on-line file, search the file for needed records, display records at the terminal, modify records as necessary at the terminal, and write the record on the local storage device. If the desired record cannot be found in the ISDS data base, a temporary record could be keyed in at the terminal and then stored locally. These records, stored only at the NPC, would be used as input to the batch NPC bibliographic file maintenance system. NPC systems staff would have to develop a hardware/software interface between the stored image of the record as it is displayed on the terminal and the NPC file maintenance system. Such an on-line access system is represented in the following schematic on the next page.

As the schematic illustrates, the terminal facility at the NPC would also allow access to another major serials data base, that supported by OCLC as part of the CONSER project. The CONSER data base contains full cataloging records for nearly 200,000 serial titles, of which 70,000 have been authenticated by the Library of Congress. Information in the authenticated records will provide data for supplementing the ISDS record. NPC staff could dial OCLC on the TYMSHARE network, search for appropriate CONSER records, and print copies of selected records for subsequent editing. With some development by NPC staff it will be possible to select, at the terminal, fields that need to be added to the ISDS records. These designated fields could then be stored and later used to augment the ISDS record, obviating the need to rekey this information.

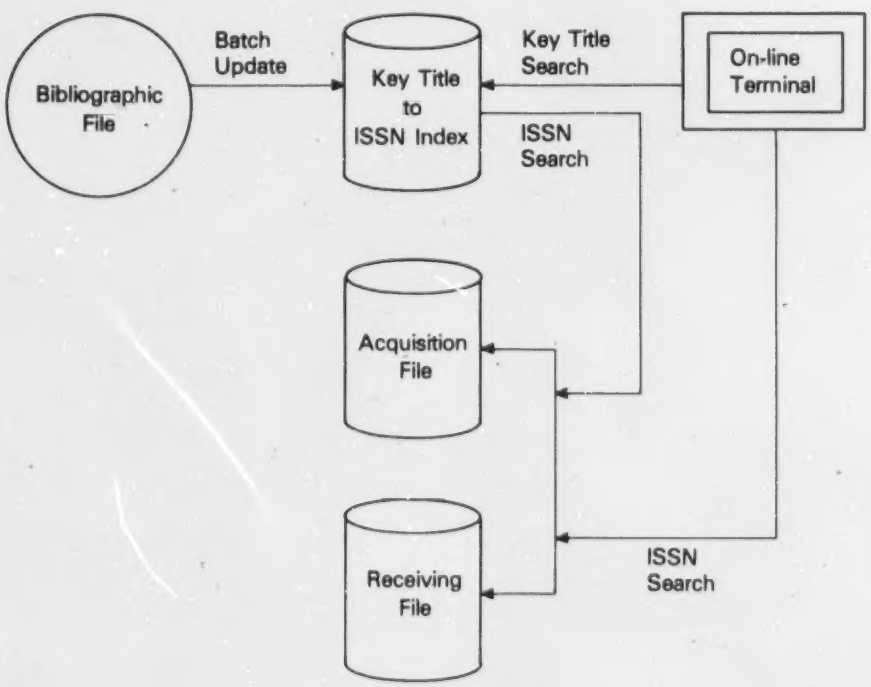
On-Line Retrieval of ISDS Records



Acquisition and Receiving Functions

Files used:
- Acquisition File
- Vendor File
- Bibliographic File
- Receiving File
- Accounts Payable File

The acquisition and receiving operations can function using a combination of on-line and batch systems. Because the bibliographic file records, which have a number of variable-length fields, are contained in a separate file, the records in support of acquisition and receiving can be of fixed length which will permit on-line update "in place." On-line access to these records will be by ISSN (plus suffix for multiple orders of the same title) and by key title using the bibliographic file to generate this index. The on-line configuration for these functions is represented in the following schematic.



The acquisition function will cover all NPC activities related to the selection of a title, the placing of an order, the continuing maintenance of an open order (e.g. subscription, exchange agreement), the assurance of receipt of the first issue, the approval of payment of invoices, and the claiming of orders and invoices. This function will have primary responsibility for the maintenance of the acquisition file and the vendor file. It will generate most of the accounts payable transactions as a direct result of recording the approval of payment of invoices for bibliographic material. In the chapter on management, the acquisition function is located in the Order/Purchasing Unit.

The process involving selection of periodicals for the NPC collection is described in the chapter on technical processing. Following selection, the Order/Purchasing Unit will prepare orders, make payments, claim missing orders and invoices, and cancel orders.

Orders

1. Once a title has been selected for inclusion in the NPC inventory, the relevant bibliographic infomation will be placed in the bibliographic file.

2. A record will be prepared for the acquisition file. The NPC will use the ISSN plus a two-digit copy number as its order number (e.g. XXXX-XXXX-XX), which will appear on all orders and correspondence relating to acquisition. Such important order information as materials budget charged, date ordered, claim date(s), selector's initials, estimated price, beginning issue instructions, etc., will be included in the record. The record will also indicate whether payment of the order is required in advance of receipt or upon receipt of material and whether the order is a continuing one (e.g., a subscription) or should be closed and removed upon receipt of material (e.g., a back file).

3. At the time a selection decision is made, the best source of supply for the title will also be determined. A supplier may be a subscription agent, distributor, publisher, wholesaler, society, exchange partner, gift donor, PL-480 agent, or other. As part of

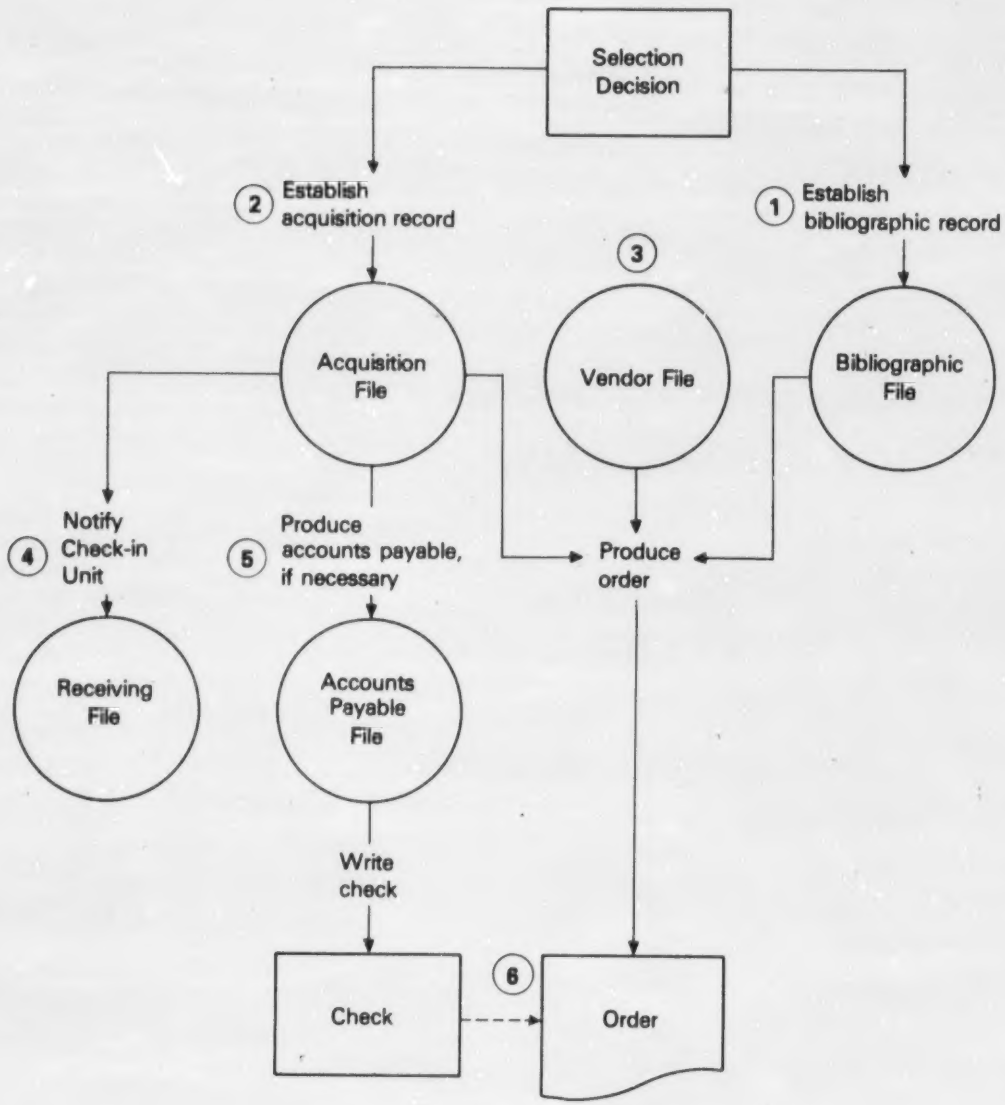
the ordering activity the vendor file will be checked to ensure that it contains a record for the selected vendor. If not, one must be established.

4. As part of establishing the order, the Check-in Unit will be notified of the order and the receiving record will either be prepared or modified in anticipation of the arrival of the material.

5. If payment in advance of receipt is required by the vendor, an accounts payable record will be generated from which a check will be produced for inclusion with the order. The payment will be recorded in the acquisition file.

6. The order may take different forms depending on the vendor selected. A purchase order, for example, may have a significantly different format and content from a request for a gift.

Order Schematic



Payments

The purpose of this activity will be to approve payments to vendors against invoices bearing the NPC order number for purchased items.

1. An invoice often accompanies material when the order is a single item. When this happens the receipt of the material will be recorded in the receiving file before the invoice approval procedure begins. In other cases invoices will arrive in advance of or after the invoiced material has been received.

2. The receiving file will be checked to see if the material has been received. This check will also be performed on invoices for continuing subscriptions. If the material has not yet arrived, the receiving file will be flagged to indicate that an outstanding invoice is being held. When material marked by a flagged record arrives, the payment approval procedure for that invoice will be initiated. If the invoice has been held for some reasonable period of time and the material still has not been received, a claim for the material will be issued.

3. Approval of the payment for an invoice will be based on several factors:

   a. The invoice can be matched against an NPC order.
   b. The billed amount is approximately the expected amount.
   c. The material delivered is the same as the material ordered.

   If an invoice cannot be approved, correspondence will be initiated with the vendor to correct the situation.

4. If payment is approved, it will be recorded in the acquisition file, which in turn will generate an accounts payable record from which a check will be produced.

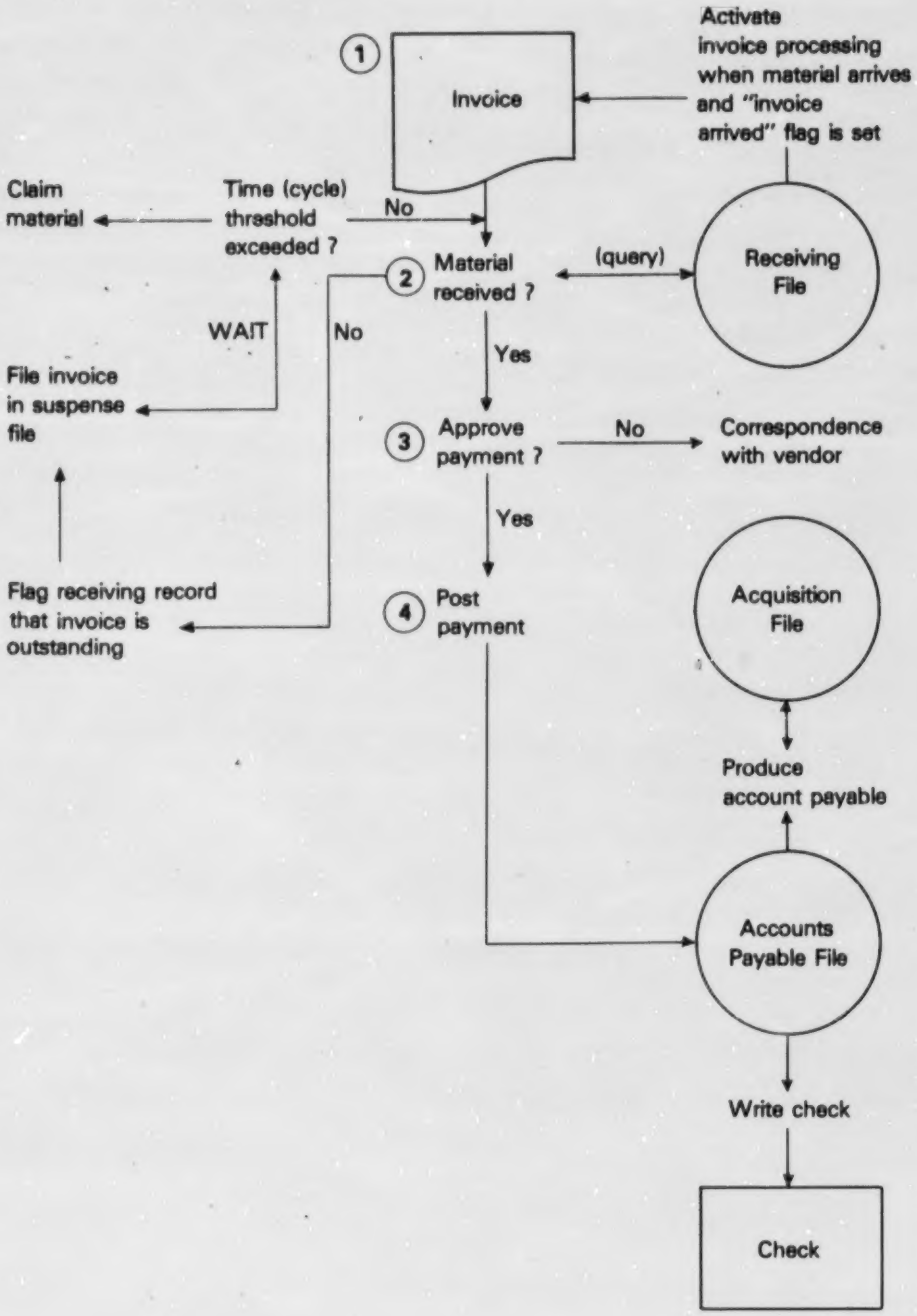
The payment amount will be entered on the record in the currency that appears on the invoice and in U.S. dollars (in an automated system foreign currency conversion would be performed by the computer). At the

same time any necessary adjustments to the fund charged for the payment will be made, so that NPC accounts will remain accurate. Finally, for continuing orders a month-year date will be logged for the expected arrival of the next invoice depending on the period covered by the current payment.

Subscriptions will be the most common type of order in the NPC; the order record for a subscription will remain on the acquisition file as long as the NPC continues to receive the item. Subscription invoices will be compared with the last three to five payments recorded in the acquisition file record. Payment approval will depend on whether the invoice amount bears a reasonable relationship to the last several payments, taking inflation into account.

If payment approval is computer based, vendors supplying multiple titles will be encouraged to supply machine-readable invoices bearing the NPC order number. Payments will be automatically matched, posted, and approved for payment with exceptions reported for review and possible negotiation with the vendor. An approach for lengthy machine-readable invoices is to pay the entire invoice, post the invoice items to the acquisition file, have the system report variances, and negotiate credits from the vendor for those invoice items in error.

Payment Schematic



Claims

The acquisition function will be responsible for generating two types of claims, one for invoices and another for material. Invoices for single and continuing orders will be claimed when material has arrived but the invoice has not; they will also be claimed when needed to prevent a subscription from lapsing. Material will be claimed when an invoice for single orders arrives but the item has not and when a first issue fails to arrive after a continuing order is placed. However, the responsibility for ensuring receipt of material on continuing orders after the first issue has arrived will belong to the Check-in Unit.

1. At least monthly the acquisition file will be reviewed to check the claim date of each invoice (entered with the last payment made or determined by receipt of material without invoice) to see if a continuing order is a candidate for invoice claiming.

2. If in staff judgment a claim is warranted, it will be sent to the vendor. Otherwise a new claim date will be set.

3. An invoice claim can reflect two conditions:

   a. An invoice is required for a continuing order to prevent a subscription from lapsing.

   b. An invoice is required for material already received in response to an NPC order.

4. At least monthly the receiving file will be reviewed to check the claim date for initial receipt of material (established when the order was placed) to see if a single or continuing order is a candidate for material claiming.

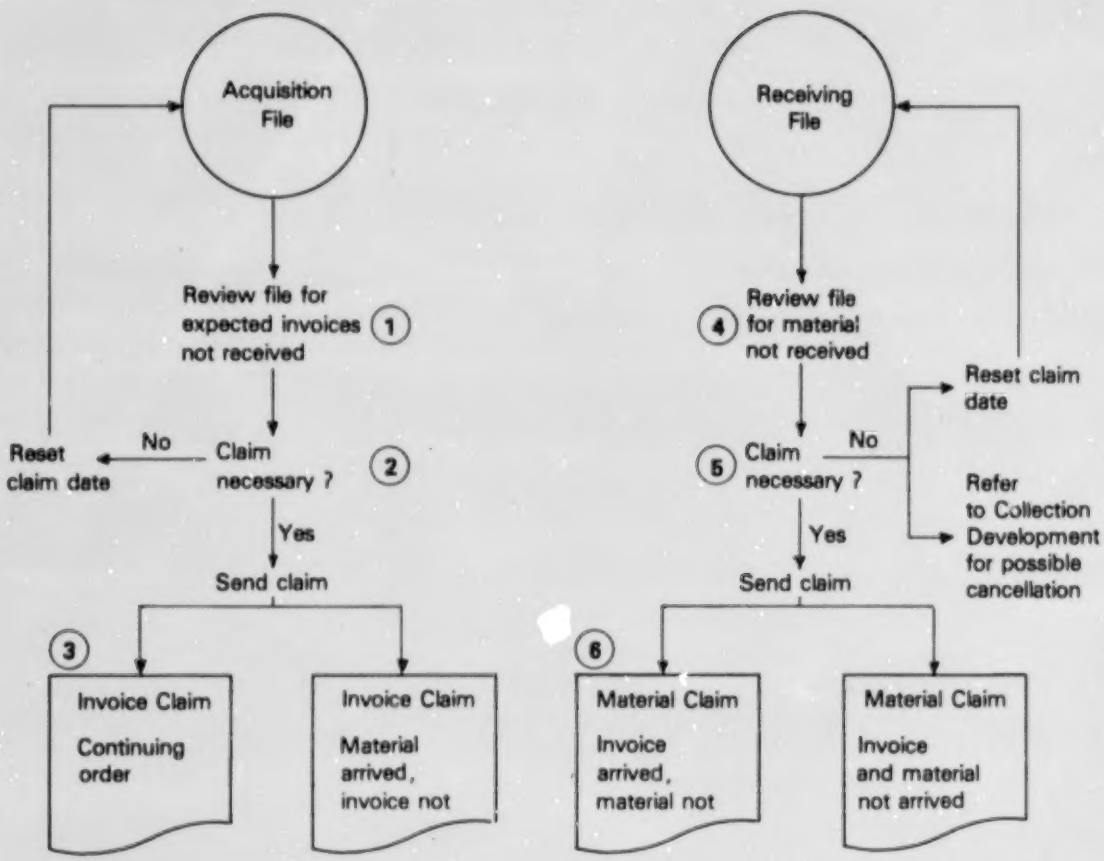
5. If in staff judgment a claim is required, it will be sent to the vendor. Otherwise a new claim date will be set or the order may be referred to collection development for possible cancellation.

6. A claim for material from a single order and a claim for the first issue of a continuing order can reflect two conditions:

   a. Material and invoice are required in response to an NPC order.

   b. Material is required for invoice already received in response to an NPC order.

Claim Schematic



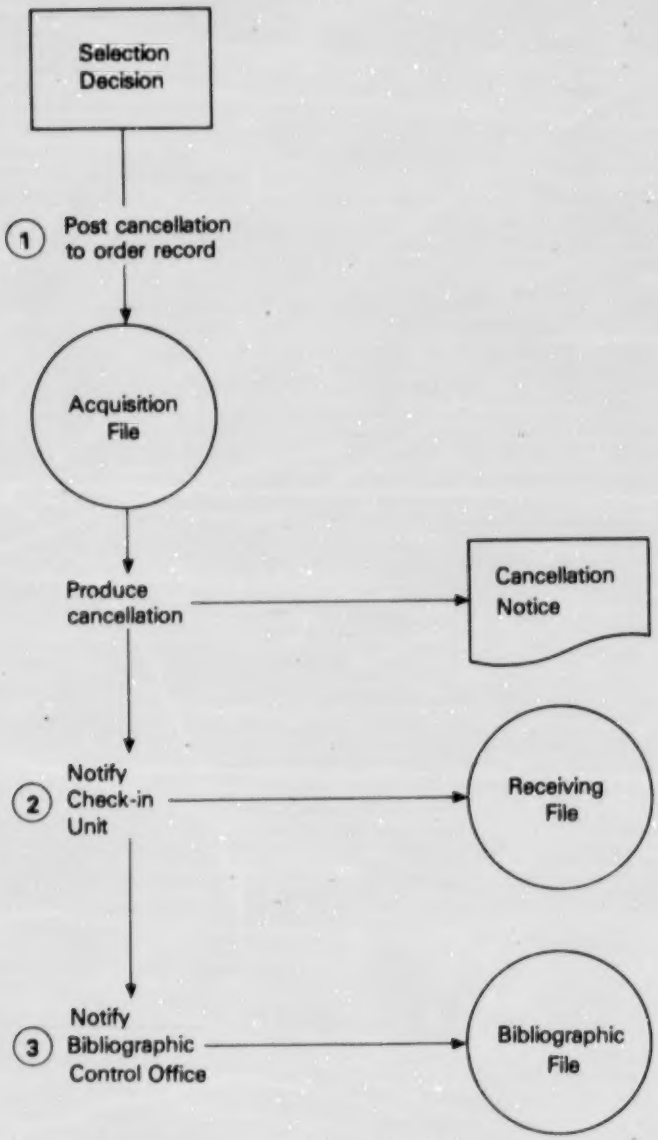
Cancellations

1. If for any reason the Collection Development Office makes a decision to cancel an order, the order record in the acquisition file will be flagged for subsequent deletion from the file. This action also will result in a cancellation notice being sent to the vendor with instructions indicating the last issue to be received.

2. The Check-in Unit will be notified of the cancellation. Often the cancellation will be made effective at the time the subscription expires. The expected expiration date, the reason for cancellation, and the disposition of the inventory will be posted to the receiving file. Even if the NPC decides not to collect a particular title, the receiving record will remain in the file in case a stray issue comes into the NPC after cancellation (e.g. a sample) and will give the Check-in Unit instructions about the disposition of these issues (discard, refer to Collection Development Office, etc.).

3. The Bibliographic Control Office will be notified of the cancellation, and the details of the collection development decision will be recorded on the bibliographic record. If the NPC retains inventory for the title, that title will continue to be displayed in the public NPC finding tool; if not, the title will not be listed, but the record for the title will remain permanently in the bibliographic file.

Cancellation Schematic



The receiving function, located in the Check-in Unit, will include all NPC activities related to the receiving of materials, the maintenance of NPC inventory records, and the claiming of material expected but not received. It will be responsible for the maintenance of the receiving file. The Check-in Unit will have two primary activities: check-in of materials and claiming of issues for continuing orders.

The ISSN will be used as often as possible to check in materials. So far, few publishers are printing the ISSN on the outside covers of their periodicals. Many titles do not even have ISSN assignments, a circumstance that will require the NPC to use its own temporary number assignments. Even if the ISSN is used extensively as suggested, the Check-in Unit will require use of the bibliographic file for key titles in order to gain indirect access to the receiving file.

In addition to its primary activities, the Check-in Unit must perform several other maintenance activities. These include:

1. Establishment of new receiving records in anticipation of new titles ordered by the NPC.

2. Notation of expected receipt of single issues and back files ordered.

3. Modification of records for titles that have ceased publication, changed title, or been cancelled by the NPC.

4. Modification of storage, special handling, and pricing information.

5. Consolidation of receipt information for individual issues into summary holdings for complete volumes.

Check-in

The Check-in Unit will be responsible for checking in all items received on either single or continuing orders.

1. If the ISSN is available on the piece or the address label, the receiving file will be searched directly by ISSN.

2. If the ISSN is not available on the item, it will be found by searching the bibliographic file by key title.

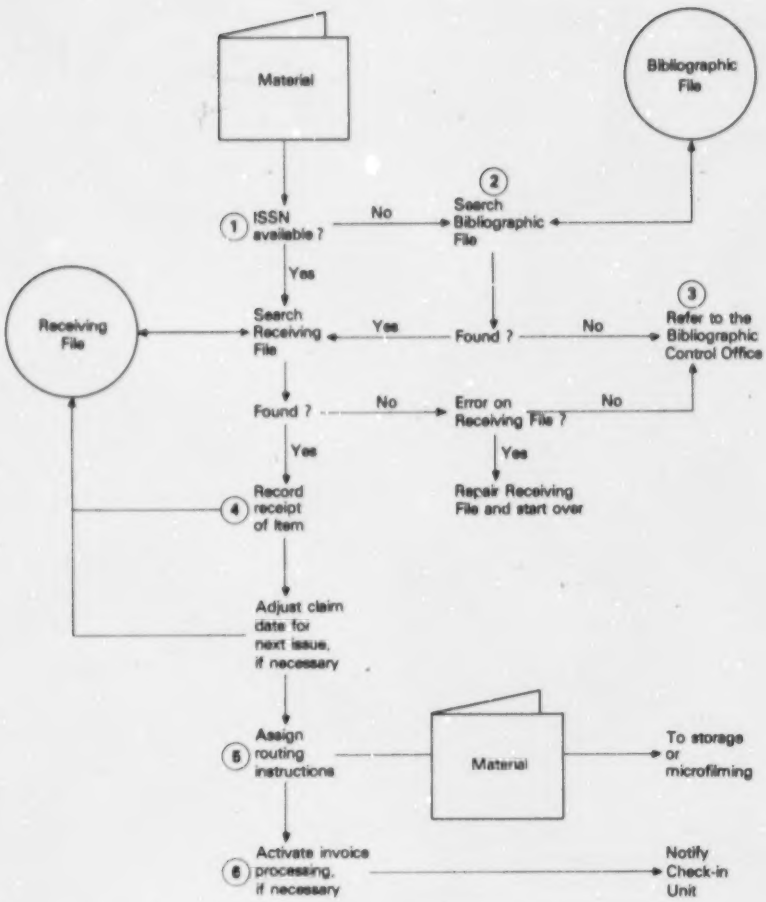
3. If a record for the item to be checked in cannot be found in the bibliographic file or some other irregularity is noted, the item will be referred to the Bibliographic Control Office as a possible title change or other problem. A sample issue can be referred to the Collection Development Office while a truly stray item will be returned to the supplier or more likely discarded.

4. Notation will be made of the receipt of the current issue (number, part, etc.) or back file. The date of receipt will be recorded and, if the pattern of receipt warrants, a change will be made in the claim date for the next expected issue.

5. The receiving file record will show the disposition of the item received; typically the instruction will be to route the item to microfilming or to storage.

6. A record that has been flagged to indicate the presence at the NPC of an outstanding invoice will produce a notification to the acquisition function to activate invoice processing once that material has been received.

Check-in Schematic

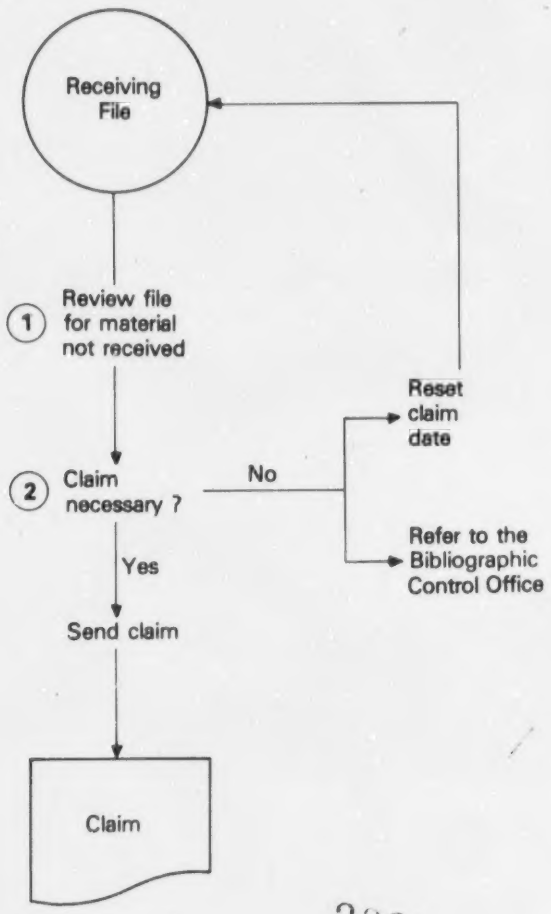


Claims

The Check-in Unit will be responsible for claims for issues received on continuing orders.

1. At least monthly the receiving file will be reviewed and claim dates checked to ascertain whether there are issues that have not been received. On a daily basis, when an issue is checked in, its record will be checked to ascertain whether all previous issues have been received. If there are no problems, a new claim date will be set.

2. If other action is required, staff will determine whether to send a claim, reorder, or refer the matter to the Bibliographic Control Office to investigate a possible title change or ceased publication.



Request Fulfillment Function

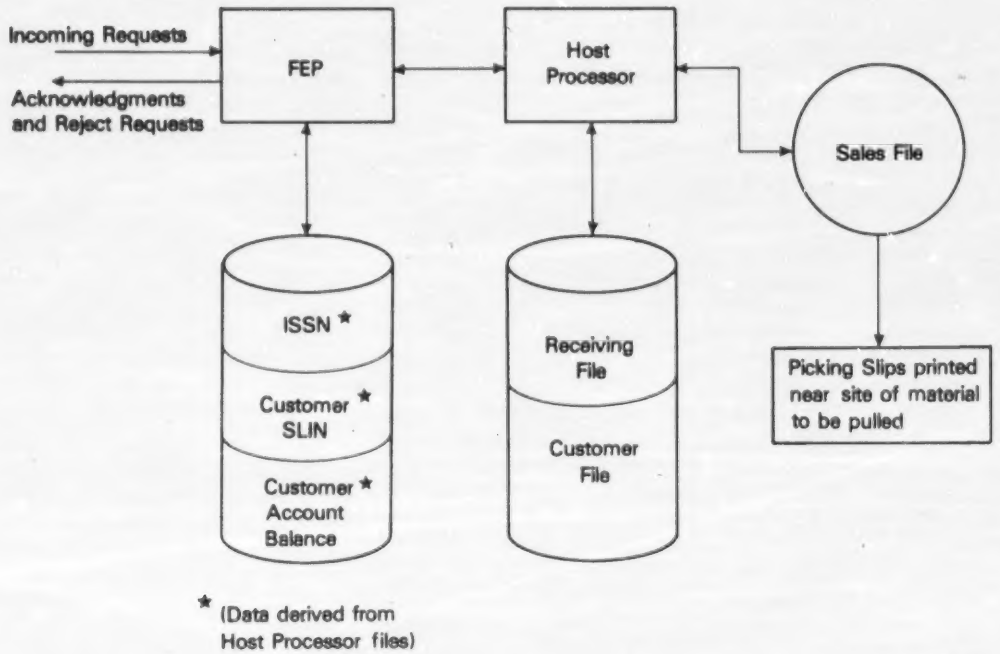
Files Used:
- Customer File
- Receiving File
- Biblographic File
- Sales File
- Accounts Payable File

The request fulfillment function, to be carried out by units of the Access Services Division, includes the activities which comprise the raison d'etre of the National Periodicals Center. All other technical processes exist to expedite this function. The processing of requests will generate a higher volume of computer activity than all other technical processes combined. By the fifth year of operation, this function will fill over five million requests per year. In order for the NPC to meet its goals for effective service to libraries, the computer support of this function must be efficient and trouble free. NPC system designers must strive to keep this portion of the system as simple and independent as possible.

One approach would be to duplicate files or portions of files in the system so that request fulfillment operates on its own version of the files using only on-line inquiry. This would insulate request fulfillment data from data supporting the acquisition and receiving functions which use both on-line inquiry and update, a mode of operation more subject to failure. The cost of additional storage may be worth the enhanced security of operation for request fulfillment.

Another promising approach is the possibility of moving some of the request fulfillment file activity off the host processor and on to the front-end processor as described in Appendix B. This configuration would allow all incoming requests to be checked for validity in the FEP with immediate turnaround of rejected requests. Only fully validated requests would be passed on to the host processor. Such a configuration is represented as shown in the following schematic.

Request Fulfillment Function
Processor and File Configuration



Although the majority of requests are to be received in machine-readable form, the NPC will eventually process a limited number received by mail and taken by telephone. To achieve this capacity some number of data entry terminals will be added to the FEP so that these requests may be entered by NPC staff. The existence of the capability within the NPC to manually enter requests will raise a policy question for NPC management. Should unprocessable machine-readable requests be returned directly to the originator, or should they be routed to NPC staff for possible problem resolution and manual reentry into the system? This latter effort will obviously be costly to the NPC, but it may be necessary to meet NPC service objectives. Since the proposed request format contains both an ISSN and key title, NPC staff may often be able to correct errors.

In the following schematics the request fulfillment function is divided into the request entry process and inventory picking and shipment.

Request Entry

1. Incoming requests will contain the information outlined in Appendix B, page 181.

2. Each request or batch of requests will first be verified to determine if the customer has an account with the NPC and if the deposit account balance is sufficient. If a request cannot be processed, it will be returned to the originator with the reason for rejection. However, if the reason is that the customer's SLIN does not appear on the customer file, the request can be referred to the User Services Office, which will attempt to determine if the customer is valid but the code simply wrong or if a new organization is attempting to use the NPC and needs instructions in establishing an account.

3. The receiving file can be searched primarily by ISSN. If the ISSN on a request is not accurate (cannot compute check digit) or not on the receiving file, the NPC will have to either return the request to the customer or attempt corrective action by searching the bibliographic file using the key title included in the request. The cost of this latter service may prohibit its provision by the NPC or an added charge may have to be applied to the order.

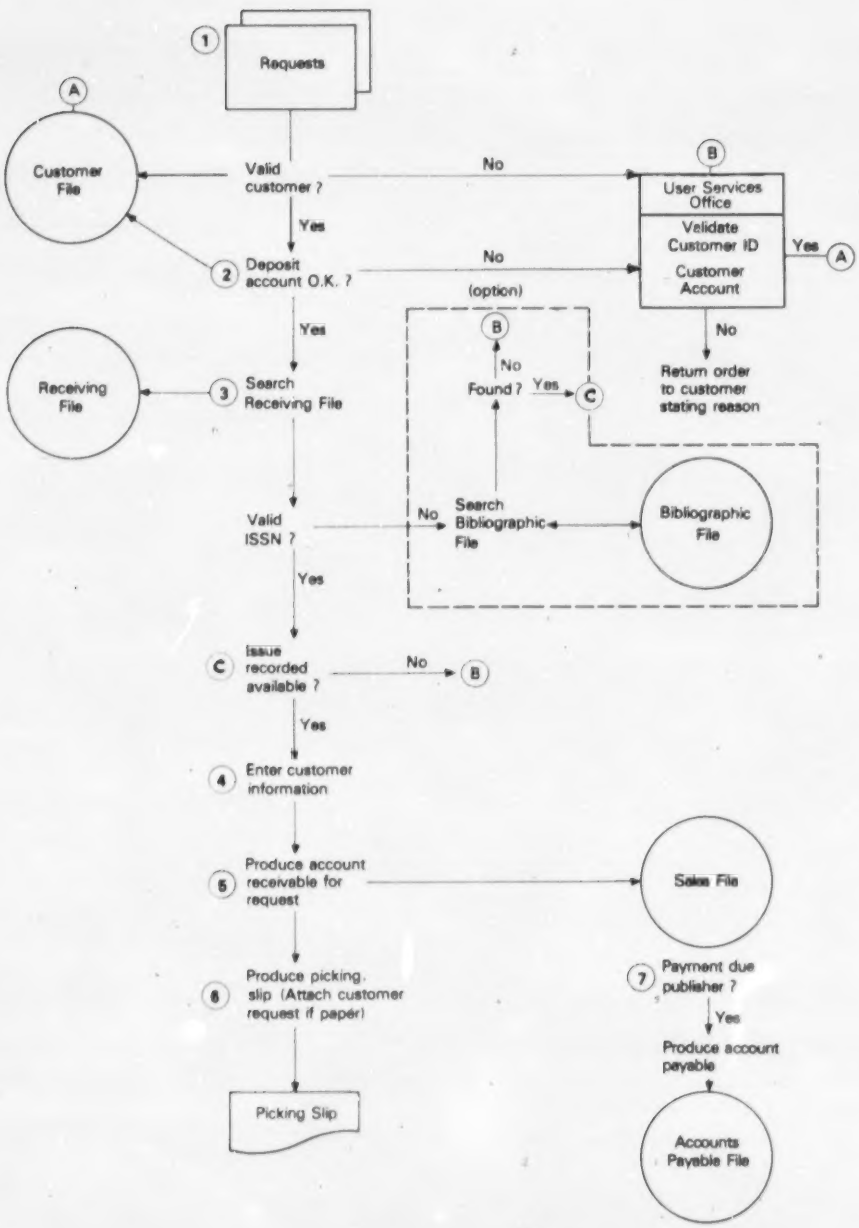
4. If the issue requested is available through the NPC either in inventory or at a referral library, the information in the customer request will be augmented with information from the customer file (name and address, shipping instructions, etc.) and the receiving file (item location, payments due, etc.) to form an NPC record of the request.

5. The record will be used to produce the sales record for the request, which is added to the sales record file.

6. The record will also be used to produce a picking slip for the item ordered. The slip will be used to locate the item requested and will have a separate mailing label attached.

7. If the item requested requires a separate payment to the publisher, an accounts payable record will be produced for information in the accounts receivable record.

Request Entry



Inventory Picking and Shipment

1. Each picking slip will have attached to it a separable mailing label with customer name and address and shipping instructions (first-class mail, UPS, bus, etc.). This information will be repeated on the picking slip along with the customer request number, special instructions, and priority. The picking slip will also show the ISSN, key title, issue specifics (volume, part, number, date, pagination), article specifics (author and title), and itemized pricing of NPC services.

2. Picking slip data will be sorted according to location either for NPC inventory or referral system libraries. No attempt will be made to maintain the integrity of the customer request batch or sequence of requests. Requests will be sorted and distributed to effect the most efficient pick and fulfillment process. Any picking batch may have requests from many customers.

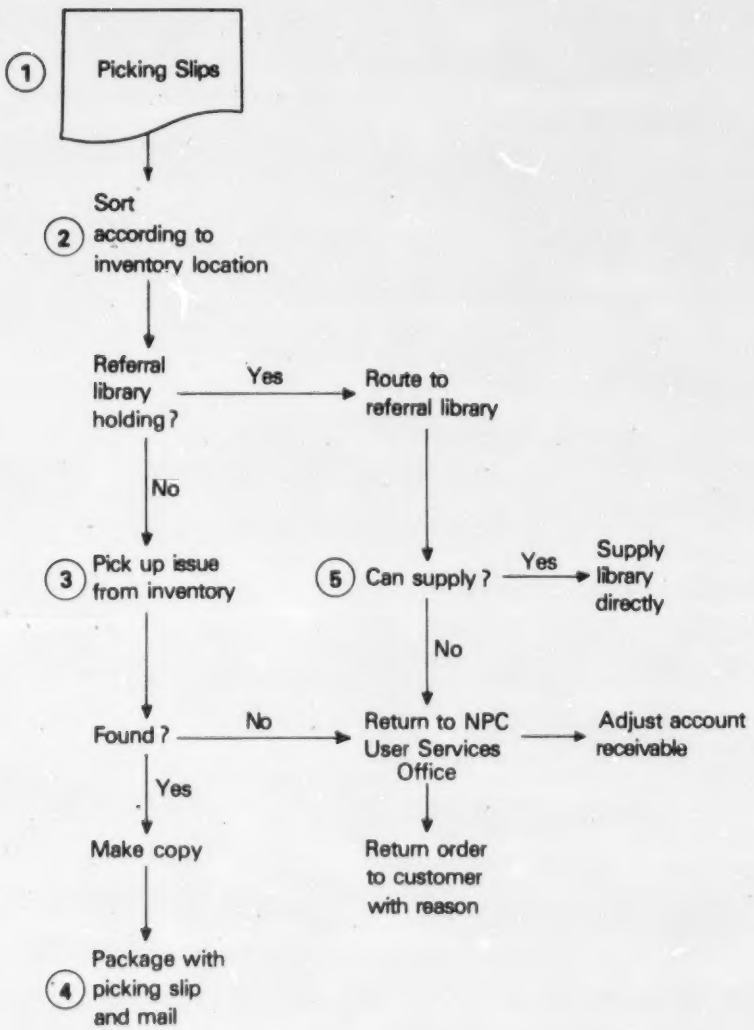
3. The item requested will be picked from the inventory of periodical titles either in microform or printed form and duplicated. If for any reason the material cannot be supplied (e.g.,the receiving record is incorrect, the issue is lost), the request will have to be returned to the customer, but first the accounts receivable record will have to be inactivated although it will be retained on the file for management information.

4. Each individual request will be packaged for shipping, and the mailing label will be affixed. The picking slip will be included with the material. The packages will be sorted according to method of delivery and sent on their way. At this point the NPC will have a system for selectively sampling the date and time at which requests are shipped so that turnaround time rates can be established and problems identified. If indicated on the picking slip, a stub bearing a time stamp will be torn off the bottom and saved for later analysis. This activity need only be periodic to establish information reliable enough for NPC management.

5. An item requested from a referral library will be supplied directly by that library. The request information transmitted from the NPC will carry exact location information for the item within the referral library, e.g., branch and call number. If for any reason the referral library cannot supply the item, the request information will be returned to the NPC so that the accounts

receivable can be inactivated and the request can be returned stating the reason for nonfulfillment. It will be necessary to develop mechanisms for measuring a referral library's turnaround rate just as it is necessary to measure the NPC's internal turnaround time.

Inventory Picking and Shipment Schematic



Administrative Support Function

Files uses: Accounts payable file
Sales file
General ledger file
Vendor file
Customer file

In addition to those mentioned above, other NPC activities that can be efficiently supported by computer-based systems include accounts payable, general ledger, personnel, payroll, fixed assets, supplies control, etc. These are common to any business operation; consequently, software and service bureau vendors have developed a variety of systems to accomplish them.

The NPC should not undertake to develop these systems anew. Through the careful selection of available software the NPC can immediately acquire systems that will provide batch maintenance of several important NPC files: sales, vendor, customer, accounts payable, and general ledger. Making selected portions of these files available on-line to save some of the processing functions described above, e.g., the customer file, is development work that the NPC system staff should undertake.

One of the principal activities of the administrative support function is accounting, which can be conveniently grouped into three categories: customer accounts, vendor accounts, and budget and management control.

Customer Accounts

1. Records on the customer file will have to be maintained to include:

   a. Additions and deletions of records.
   b. Modifications to information in a customer record.

c. Posting of credits to customer deposit account balance as payments are received.
d. Debiting the customer deposit balance to reflect payment for services provided by the NPC. This activity probably does not have to be performed any more often than once daily.

2. Each customer record in the customer file will be assigned a unique Standard Library Identification Number. The structure of the file will be complicated by the following requirements:

a. Each customer record can have associated with it more than one deposit account balance with one of the accounts designated as the default account for debiting unless otherwise shown on the customer's request for materials.
b. Each customer request can make specific ship-to, bill-to designations or use defaults that exist on the customer record. For example, a library consortium can request that materials be sent directly to a member or member subunit of the consortium and that one of the consortium subaccounts be billed for the service. On the other hand, the consortium member can also maintain its own deposit account or separate subaccounts for its subunits and request materials directly from the NPC.

3. At intervals of probably no less than one month (quarterly for less active customers) the NPC will issue a statement showing:

a. Deposit account balance at start of statement period.
b. Credits to deposit account during statement period.
c. Itemized services performed by the NPC during the statement period by date and ISSN, showing the charge for each item.
d. Deposit account balance at the end of the statement period.

Vendor Accounts

1. Vendor records (including referral libraries) on the vendor file will have to be maintained by adding, deleting, and modifying records in the file.

2. The accounts payable file will control payments made to vendors, including referral libraries, for periodical materials, supplies, and services. Each record in the file represents an invoice that has been reviewed and approved for payment. Sources of records for

the accounts payable file include:

a. The acquisition function for periodicals acquired by the NPC.
b. Request fulfillment function for payments due publishers for materials supplied by the NPC.
c. Purchasing of other supplies and services.

The file will also contain:

a. Indication of cash disbursements for each account.
b. Adjustments and credits.
c. Past cumulative records and other history.

3. As a result of the maintenance of the vendor and accounts payable files, regular payments will be made to vendors. Several reports will be produced showing:

a. The status of each vendor's account with exception criteria applied to various problems (e.g. large outstanding balances).
b. Cash disbursements and projected cash requirements for the next several months.

Budget and Management Control

1. A general account ledger will be maintained for all NPC divisions. Each division will be treated as a cost center with a detailed budget.

2. The general ledger will post cash receipts for customer deposit accounts and other income, cash disbursements from the accounts payable file, and payroll and other expenditures against the various budget categories and will produce reports showing the financial performance of the NPC (e.g. a report matching expenditures in comparison with budget by time period). For management purposes the reports will highlight important variances from the budgetary plan.

3. The request fulfillment file will be an important source of information for management of the NPC. It can be analyzed periodically to indicate:

a. A profile of customers using NPC services.
b. A profile of NPC titles used for request fulfillment.
c. A profile of demand cycles; (e.g. seasonal, time of day).
d. Average cost of NPC services to customers by various categories.

APPENDIX D

TECHNICAL PROCESSING: ESTIMATED LOAD FACTORS

	ESTIMATES			
	First Year		Fifth Year	
Bibliographic Function	Low	High	Low	High
Size of bibliographic file				
NPC titles	30,000	36,000	47,400	59,300
NPC desiderata	5,000	10,000	5,000	10,000
NPC rejected and erroneous titles	1,000	2,000	10,000	15,000
Referral titles	8,000	14,000	25,000	35,000
Total file size	44,000	62,000	87,400	119,300
Growth factors				
Titles added	2,000	5,000	2,000	5,000
Back file acquisitions[1]	500	2,000	500	2,000
Title changes (5%)	1,900	2,500	3,600	4,700
Ceased titles[2]	1,000	2,000	1,000	2,000
Acquisition Function				
Vendor file	1,000	10,000	5,000	20,000
Acquisition file	30,300	36,400	47,900	59,900
Acquisition method				
Purchase	29,700	37,620	31,284	48,923
Other	1,980	3,300	16,307	20,856
New titles ordered	2,000	5,000	2,000	5,000
New back file orders	500	2,000	500	2,000
Invoices processed[3]	7,500	12,000	12,000	20,000
Invoice claims	0	100	200	500

Receiving Function	First Year Low	First Year High	Fifth Year Low	Fifth Year High
Size of receiving file (active and rejected titles)	31,300	38,400	57,900	74,900
New records				
New titles	2,000	5,000	2,000	5,000
Title changes	1,900	2,500	3,600	4,700
Holdings record modification (back file additions, etc.)	15,000	40,000	10,000	15,000
Claims issued	3,000	3,600	4,700	5,900
Issues received (11 [illegible]es per record)	333,300	400,400	526,900	658,900

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1. The acquisition of back files will sometimes require the addition of records to the file due to title changes over the life of the periodical.

2. These file transactions will not usually result in the record being deleted from the file unless the NPC decides to totally eliminate its inventory of the periodical.

3. The number of invoices which must be processed will be significantly affected by:

    a. The degree to which the NPC takes advantage of discounts for multiyear subscriptions.

    b. The number of subscriptions placed with a single vendor.

    c. The number of periodicals received from the publisher at no cost.

APPENDIX E

FULL-TIME EQUIVALENT STAFFING LEVELS BY YEAR

Office of the Director

	Year 1	Year 2	Year 3	Year 4	Year 5
Director	1.00	1.00	1.00	1.00	1.00
Senior Executive Secretary	.75	1.00	1.00	1.00	1.00
Deputy Director	1.00	1.00	1.00	1.00	1.00
Executive Secretary	1.00	1.00	1.00	1.00	1.00
Administrative Assistant	.75	1.00	1.00	1.00	1.00
Secretary	1.00	1.00	1.00	1.00	1.00
Legal Affairs Office					
Legal Affairs Officer	1.00	1.00	1.00	1.00	1.00
Law Clerk	.75	1.00	1.00	1.00	1.00
Secretary	1.50	2.00	2.00	2.00	2.00
Planning and Systems Development Office					
Associate Director	.50	1.00	1.00	1.00	1.00
Secretary	.25	1.00	1.00	1.00	1.00
Clerk/Typist		.75	1.00	1.00	1.00
Systems Analyst	1.00	1.00	1.00	1.00	1.00
Programmer/Analyst	1.50	2.00	2.00	2.00	2.00
Programmer Trainee	.50	1.00	1.00	1.00	1.00
Communications Specialist	.75	1.00	1.00	1.00	1.00
Communications Programmer	.75	1.00	1.00	1.00	1.00
Operations Research Specialist	.25	1.00	1.00	1.00	1.00
Research Analyst		.50	2.00	2.00	2.00
Total for OFFICES	14.25	20.25	22.00	22.00	22.00

Resource Development and Preservation Division

	Year 1	Year 2	Year 3	Year 4	Year 5
Division Office					
Associate Director	.75	1.00	1.00	1.00	1.00
Executive Secretary	.63	1.00	1.00	1.00	1.00
Collection Development Office					
Manager	.50	.50	.50	.50	.50
Resource Specialist	2.00	3.00	3.00	3.00	3.00
Clerk	2.00	3.00	3.00	3.00	3.00
Bibliographic Control Office					
Manager		.50	.50	.50	.50
Senior Clerk		1.00	1.00	1.00	1.00
Acquisitions Department					
Manager	.75	1.00	1.00	1.00	1.00
Order/Purchasing Unit					
Purchasing Agent	.50	1.00	1.00	1.00	1.00
Secretary		.50	1.00	1.00	1.00
Clerk	1.50	3.00	3.00	3.00	3.00
Check-in Unit					
Check-in Supervisor	.50	1.00	1.00	1.00	1.00
Clerk	.25	4.00	4.00	4.00	5.00
Physical Preparation Department					
Manager	.25	1.00	1.00	1.00	1.00
Microfilming Unit					
Microfilm Supervisor	.50	1.00	1.00	1.00	1.00
Camera Operator		3.00	5.00	5.00	5.00
Clerk	.25	2.00	2.00	2.00	2.00
Inspection Specialist	.50	2.00	2.00	2.00	2.00
Microfilm Technician	.25	1.00	1.00	1.00	1.00
Preservation Unit					
Preservation Supervisor		.25	1.00	1.00	1.00
Preservation Technician			1.00	1.00	1.00
Total for DIVISION	11.13	30.75	35.00	35.00	36.00

Access Services Division

	Year 1	Year 2	Year 3	Year 4	Year 5
Division Office					
Associate Director	.50	1.00	1.00	1.00	1.00
Executive Secretary		.38	.50	.75	1.00
User Services Office					
Manager		.75	1.00	1.00	1.00
Account Representative		.25	1.50	2.00	2.00
Original Form Department					
Manager		.17	1.00	1.00	1.00
Supervisor					1.00
Clerk			5.00	17.00	27.80
Microform Department					
Manager		.17	1.00	1.00	1.00
Supervisor				.50	1.00
Clerk			6.65	22.45	36.70
Total for the DIVISION	.50	2.72	17.65	46.70	73.50

Computer and Support Services Division

	Year 1	Year 2	Year 3	Year 4	Year 5
Division Office					
Associate Director	.75	1.00	1.00	1.00	1.00
Executive Secretary	.50	.75	1.00	1.00	1.00
Clerk/Typist		.75	1.00	1.00	1.00
Computer/Communications Department					
Manager		.25	1.00	1.00	1.00
Communication Specialist		.25	1.00	1.00	1.00
Computer Operator		.50	2.00	2.00	2.00
Personnel Department					
Manager	.75	1.00	1.00	1.00	1.00
Executive Secretary	.75	1.00	1.00	1.00	1.00
Personnel Administrator	.25	1.00	1.00	1.00	1.00
Personnel Clerk	.25	1.00	2.00	2.00	2.50
Fiscal Services Department					
Manager	.50	1.00	1.00	1.00	1.00
Accounting Supervisor	.75	1.00	1.00	1.00	1.00
Bookkeeper	.25	1.00	1.00	1.00	1.00
Accounting Clerk		1.25	1.50	1.50	1.50
Payroll Supervisor	1.00	1.00	1.00	1.00	1.00
Payroll Clerk	.25	.50	.50	.50	.50
Physical Plant Department					
Manager	.25	1.00	1.00	1.00	1.00
Security Officer	.50	1.00	1.00	1.00	1.00
Inventory Supervisor	.50	1.00	1.00	1.00	1.00
Custodial/Maintenance Supervisor	.50	1.00	1.00	1.00	1.00
Clerk		.50	1.00	2.00	2.00
Messenger			1.00	1.00	1.00
Custodians	1.00	1.00	2.00	3.00	3.00
HVAC Mechanic	1.00	1.00	1.00	1.00	1.00
Groundskeeper		.50	1.00	1.00	1.00
Total for DIVISION	9.75	20.25	28.00	30.00	30.50
Total for NPC	35.63	73.97	102.65	133.70	162.00

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ACRONYMS USED IN THIS PLAN

ACM	Associated Colleges of the Midwest
AACR II	Anglo-American Cataloging Rules, Second Edition
ANSI	American National Standards Institute
ARL	Association of Research Libraries
ASCII	American Standard Code for Information Interchange
ASD	Access Services Division
ASR	Automatic Send/Receive
AT&T	American Telephone and Telegraph Co.
BALLOTS	Bibliographic Automation of Large Library Operations using a Time-sharing System
BAUDOT	The standard five-channel teletypewriter code
BLLD	British Library Lending Division
BRS	Bibliographic Retrieval Services, Inc.
CLR	Council on Library Resources, Inc.
CODEN	A five character, alphanumeric code that provides concise, unique, and unambiguous identification of serial and nonserial titles
COM	Computer output microfilm
CONSER	Conversion of Serials project
CONTU	National Commission on New Technological Uses of Copyrighted Works
CRL	Center for Research Libraries
CRT	Cathode ray tube display terminal
CSSD	Computer and Support Services Division
DDS	Dataphone Digital Service
EBCDIC	Extended Binary Coded Decimal Interchange Code

FEP	Front-end processor
FTE	Full-time equivalent
GNT	Gross national traffic
HVAC	Heating, ventilation, air conditioning
ILL	Interlibrary loan
INWATS	Wide Area Telecommunicatons Service for incoming traffic
ISDS	International Serials Data System
ISSN	International Standard Serial Number
KSR	Keyboard Send/Receive
LC	Library of Congress
MARC	Machine-Readable Cataloging
MARC-S	Machine-Readable Cataloging - Serials
MINITEX	Minnesota Interlibrary Telecommunications Exchange
MODEM	Modulator-Demodulator
MUX	Multiplexor
NCLIS	National Commission on Libraries and Information Science
NLM	National Library of Medicine
NPC	National Periodicals Center
NSDP	National Serials Data Program
NSF	National Science Foundation
NYSILL	New York State Interlibrary Loan network
OCLC	OCLC, Inc., formerly Ohio College Library Center
OCR	Optical character recognition
PL-480	Agricultural Trade Development and Assistance Act of 1954
RDPD	Resource Development and Preservation Division
SAN	Standard Address Number
S/C 30	ANSI Committee Z39, Subcommittee 30

S/C 45	ANSI Committee Z39, Subcommittee 45
SDA	Source data automation
SLIN	Standard Library Information Number
TELENET	A commercial value added network offered by Telenet Communications Corporation
TELEX	Teletypewriter Exchange, a teletypewriter communications network
TTY	Teletypewriter
TWX	Teletypewriter Exchange Service
TYMNET	A commercial value added network offered by Tymshare, Inc.
UNESCO	United Nations Educational, Scientific, and Cultural Organizaton
UNISIST	A UNESCO program for cooperation in the field of technical information
UPS	United Parcel Service
USBE	Universal Serials and Book Exchange, Inc.
USPS	United States Postal Service
VAN	Value Added Network
WPM	words per minute
Z39	American National Standards Institute Committee Z39 on Library Work, Documentation, and Related Publishing Practices